

# Technical Construction Files for

## UV Sterilizer Lamp

Model Number: /6649

Prepared for :  
Address :

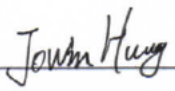
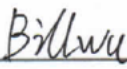

Prepared by : Shenzhen SCT-CERT Technology Co., Ltd.

Address : Building A&B, Baoshi Science&Technology Park,  
Baoshi Road, Baoan District, Shenzhen, Guangdong.

Report No. : tcf20200518066E1  
Date of Test : May 13~18, 2020  
Date of Report : May 18, 2020

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<b>Applicant:</b> Address:			
<b>Manufacturer:</b> Address:			
<b>E.U.T:</b>	UV Sterilizer Lamp		
<b>Model Number:</b>	/6649		
<b>Trade Name:</b>	/	<b>Serial No.:</b>	-----
<b>Date of Receipt:</b>	May 13, 2020	<b>Date of Test:</b>	May 13-18, 2020
<b>Test Specification :</b>	EN 55014-1:2017+A11:2020 EN 55014-2:2015 EN 61000-3-2:2019 EN 61000-3-3:2013+A1:2019		
<b>Test Result:</b>	The equipment under test was found to be compliance with the requirements of the standards applied.		
			<b>Issue Date: May 18, 2020</b>
<b>Tested by:</b>	<b>Reviewed by:</b>	<b>Approved by:</b>	
 Jowin Huang / Engineer	 Bill Wu / Supervisor	 Aiden Zhang / Supervisor	
<b>Other Aspects:</b> None.			
Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of SCT.			

## 1. GENERAL PRODUCT INFORMATION

### 1.1.Product Function

Refer to Technical Construction Form and User Manual.

### 1.2.Description of Device (EUT)

Description : UV Sterilizer Lamp  
 Model No. : 6649  
 Power input : 4.65-5.3VDC  
 Output :  
 Clock Frequency :  $\leq 15\text{MHz}$

### 1.3.Difference between Model Numbers

Note:Details please refer to chapter 1.2.

### 1.4.Independent Operation Modes

Pretest Mode	Description
Mode 1	On
Remark: Test at about 160 kHz and at about 50 MHz shall be made over a range of 0,9 to 1,1 times the rated voltage in order to check whether the level of disturbance varies considerably with the supply voltage; in which case, the measurements are to be made at the voltage that causes maximum disturbance. All models were tested, the Full load was selected as the worst model and its data have been recorded in this report.	

### 1.5.Test Supporting System

None.

## 2. TEST SITES

### 2.1. Test Facilities

Name of Firm : Shenzhen SCT-CERT Technology Co., Ltd.

Site Location : Building A&B, Baoshi Science&Technology Park,  
Baoshi Road, Baoan District, Shenzhen, Guangdong.

### 2.2. Test Summary

Test Item	Condition	Standard	Result
Conducted Emission at mains terminals	150kHz to 30MHz	EN 55014-1:2017+A2:2020	N/A
Conducted Emission at the load and additional terminals	150kHz to 30MHz	EN 55014-1:2017+A2:2020	N/A
Discontinuous Emission	150kHz to 30MHz	EN 55014-1:2017+A2:2020	N/A
Disturbance Power	30MHz to 300MHz	EN 55014-1:2017+A2:2020	N/A
Radiated Emission	30MHz to 1000MHz	EN 55014-1:2017+A2:2020	N/A
Harmonic of current	CLASS A	EN 61000-3-2: 2019	N/A
Flicker	4%	EN 61000-3-3: 2013+A1:2019	N/A
ESD immunity	C:±4kV; A:±8kV	EN 55014-2:2015 Reference: EN 61000-4-2:2009	Pass
Radiated EM field immunity	80MHz to 1000MHz 3V/m	EN 55014-2:2015 Reference:EN 61000-4-3:2010	Pass
EFT immunity	±1kV	EN 55014-2:2015 Reference: EN 61000-4-4:2012	N/A
Surge immunity	<input type="checkbox"/> Line to Line:±1.0kV; <input type="checkbox"/> Line to earth:±2.0kV	EN 55014-2:2015 Reference: EN 61000-4-5:2014	N/A
Inject current immunity	150KHz to 230MHz 3Vrms	EN 55014-2:2015 Reference: EN 61000-4-6:2014	N/A
Voltage dips and interruption immunity	70%,40%, 0%, of EUT	EN 55014-2:2015 Reference: EN 61000-4-11:2004	N/A
Remark: 1. The symbol "N/A" in above table means <u>Not Applicable</u> . 2. When determining the test results, measurement uncertainty of tests has been considered. 3. According to EN 61000-3-2, for products ≤75 watts, no limits are defined for the harmonics test except discharging light. 4. Classification of the EUT: The product is belongs to Category III.			

<b>System Measurement Uncertainty</b>	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber	3.60dB
Uncertainty for Conducted Emission.	2.60dB
Uncertainty for Radiated Electromagnetic Disturbances	2.60dB

### 2.3.List of Test and Measurement Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<b>For conducted emission at the mains terminals and load port test</b>					<input type="checkbox"/>
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 9,20	Apr 9,21
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr 9,20	Apr 9,21
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr 9,20	Apr 9,21
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr 9,20	Apr 9,21
Voltage Probe	CHWARZBECK	A130302	KWE-053	Apr 12,20	Apr 12,21
<b>For disturbance power test</b>					<input type="checkbox"/>
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 9,20	Apr 9,21
Absorbing Clamp	Luthi	MDS-21	4056	Apr 13,20	Apr 13,21
Clamp Attenuation	HUBER+SUHNER	CBL2-NB-9m	100104-22 39000-01	Apr 13,20	Apr 13,21
<b>For radiated emission test (30MHz-1GHz)</b>					<input checked="" type="checkbox"/>
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 9,20	Apr 9,21
Bilog Antenna	ETS-LINDGREN	3142D	00135452	Apr 2,20	Apr 2,21
Spectrum Analyzer	Agilent	8593E	3911A0427 1	Apr 9,20	Apr 9,21
3m Semi-anechoic Chamber	ETS-LINDGREN	966	170326	Apr 2,16	Apr 2,17
Signal Amplifier	SONOMA	310	186956	Apr 9,20	Apr 9,21
RF Cable	IMRO	IMRO-400	966 Cable 1#	Apr 9,20	Apr 9,21
MULTI-DEVICE Controller	ETS-LINDGREN	2090	126913	N/A	N/A
Antenna Holder	ETS-LINDGREN	2070B	00109601	N/A	N/A
<b>For discontinuous emission test</b>					<input type="checkbox"/>
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 27,20	Apr 27,21
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr 27,20	Apr 27,21
Multi-channel Discontinuous Interference Analyzer	SCHAFFNER	DIA1512D	22345	Apr 27,20	Apr 27,21

<b>For harmonic current emissions and voltage fluctuations/flicker test</b>					<input type="checkbox"/>
5kVA AC Power Source	California Instruments	5001iX	60138	Apr 9,20	Apr 9,21
Harmonic/Flicker Test System	California Instruments	PACS-1	72847	Apr 9,20	Apr 9,21
<b>For electrostatic discharge immunity test</b>					<input checked="" type="checkbox"/>
ESD Generator	TESEQ	NSG437	433	Apr 11,20	Apr 11,21
<b>For electrical fast transient/burst immunity test</b>					<input type="checkbox"/>
EFT Tester	EMtest	EFT500N5	V1105108698	Apr 9,20	Apr 9,21
EFT Coupling Clamp	EMtest	HFK	0211-168	Apr 9,20	Apr 9,21
<b>For surge immunity test</b>					<input type="checkbox"/>
Surge Tester	EMtest	UCS500N7	V1105108699	Apr 9,20	Apr 9,21

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<b>For voltage dips and short interruptions immunity test</b>					<input type="checkbox"/>
Dips Tester	EVERFINE	EMS61000-11K	YG100319N11 040005	Apr 9,20	Apr 9,21
<b>For radio frequency electromagnetic field immunity (R/S) test (STC)</b>					<input checked="" type="checkbox"/>
BiConiLog Antenna	ETS	3142C	00060445	Nov.28,19	Nov.28,20
Amplifier	BONN ELEKTRONIK	BLWA0840-50/30D	066454B	Nov.28,19	Nov.28,20
Amplifier	BONN ELEKTRONIK	BLWA0840-50/100D	066454A	Nov.28,19	Nov.28,20
Signal Generator	Rohde&Schwarz	SML03	102947	Nov.28,19	Nov.28,20
Signal Generator	Rohde&Schwarz	SMB100A	1406600K02 -104532-DF	Nov.28,19	Nov.28,20
Power Meter	Rohde&Schwarz	NRVD	102051	Nov.28,19	Nov.28,20
<b>For injected currents susceptibility test</b>					<input type="checkbox"/>
C/S Test System	FRANKONIA	CIT-10	126B1164	Apr 9,20	Apr 9,21
CDN	Luthi	L-801 M2/M3	2789	Apr 9,20	Apr 9,21
Electromagnetic Injection Clamp	Luthi	EM101	36041	Apr 12,20	Apr 12,21
Note: <input checked="" type="checkbox"/> Used <input type="checkbox"/> Not Used					

### 3. TEST SET-UP AND OPERATION MODES

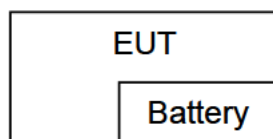
#### 3.1.Principle of Configuration Selection

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

**Immunity:** The equipment under test (EUT) was configured to the representative operating mode and conditions.

#### 3.2.Block Diagram of Test Setup

System Diagram of Connections between EUT and Simulators



*(EUT: UV Sterilizer Lamp)*

#### 3.3.Test Operation Mode and Test Software

Note:Refer to Test Setup in clause 4 & 5.

#### 3.4.Special Accessories and Auxiliary Equipment

None.

#### 3.5.Countermeasures to Achieve EMC Compliance

None.



## 4. TEST RESULTS

### 4.1. Conducted Emission at the Mains Terminals Test

**Result** : **Pass**  
**Test Site** : 944 Shielded Room  
**Limits** : EN 55014-1

Frequency range MHz	Limits dB( $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56	59 to 46
0.5 to 5	56	46
5 to 30	60	50

NOTE: 1.The lower limit shall apply at the transition frequencies.  
 2.The limit decreases linearly with the logarithm of the frequency in the range 0.05 MHz to 0.15MHz and 0.15MHz to 0.50MHz

#### Test Specification

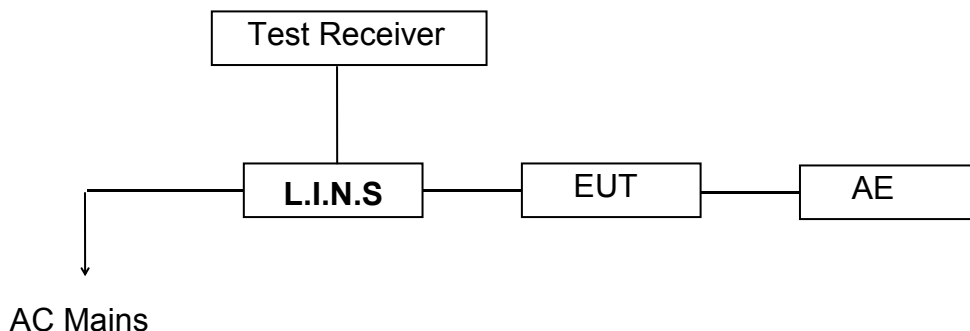
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 1 m, the excess was folded back and forth parallel to the cable at the center so as to form a bundle no longer than 0.4 m.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The bandwidth of the test receiver was set at 9 kHz.

The worst test data were reported on the following page.

#### Test Set-up



## 4.2. Conducted Emission at the load and additional terminals Test

**Result** : N/A  
**Test Site** : 944 Shielded Room  
**Limits** : EN 55014-1

Frequency range MHz	Limits dB( $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	80	70
0.50 to 30	74	64

### Test Specification

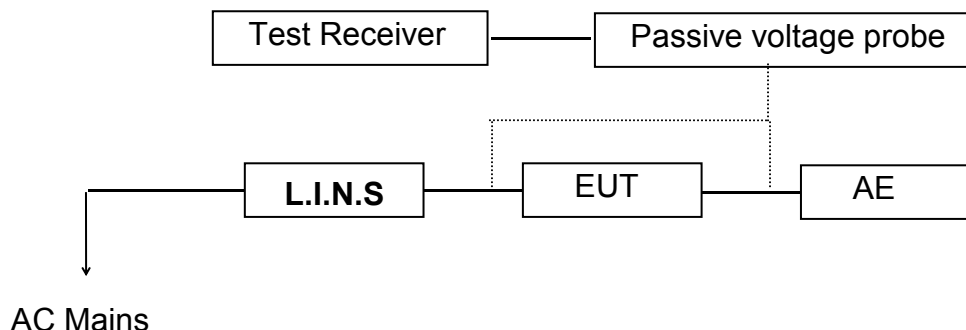
The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 1 m, the excess was folded back and forth parallel to the cable at the center so as to form a bundle no longer than 0.4 m. Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.

The bandwidth of the test receiver was set at 9 kHz.

The worst test data were reported on the following page.

### Test Set-up



### 4.3. Terminal Discontinuous Disturbance Voltage Emission Test

**Result** : N/A  
**Test Site** : STC Lab Shielded Room  
**Limits** : EN 55014-1

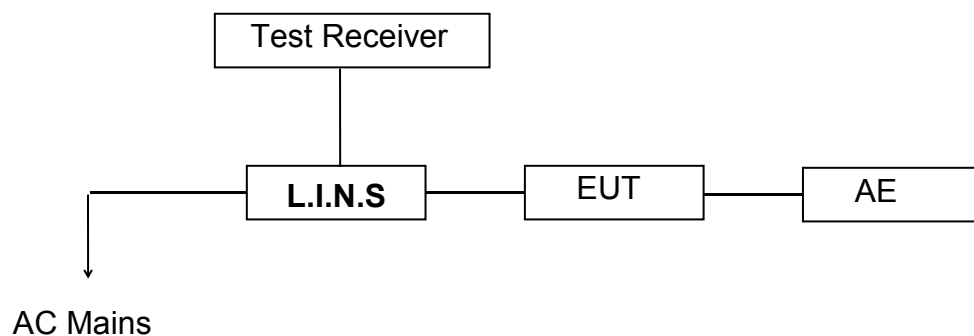
44dB	for $N < 0,2$ , or
$20 \lg (30/N)$ dB	for $0,2 \leq N < 30$
Note: N=click rate : In general the number of clicks or switching operations within one minute; this Figure is being used to determine the click limit	

#### Test Specification

- 1.The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN) and switching operation.
- 2.Connect the control cable between Click Analyzer and switching operation and connect the interface cable between Click Analyzer and the PC.
- 3.The LISN power output was connected to the EUT power input and its power input was connected to the switching operation power output.
- 4.Connect the switching operation power input to the mains power outlet.
- 5.Switch the switching operation, LISN and the test equipment power-on.
- 6.The Click Analyzer BNC 50 Ω coaxial input was connected to the LISN BNC 50Ω coaxial output through coaxial cable.
- 7.Using the Click Analyzer software, select the appropriate line in which the current is going to be measured. This line should be the same as the one selected on the LISN.
- 8.The measurement time was decided by the shorter time of either:
- 9.The time to register 40 clicks, or, where relevant, 40 switching operations, or 120 minutes.
- 10.These clicks of frequencies were searched and reported for 150 kHz, 500kHz, 1.4MHz and 30MHz.
- 11.All the test data were reported on the following page.
- 12.Measurement Uncertainty:  $\pm 2.3$  dB at a level of confidence of 95%.

#### Test Set-up

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#### 4.4. Disturbance Power Test (30MHz to 300MHz)

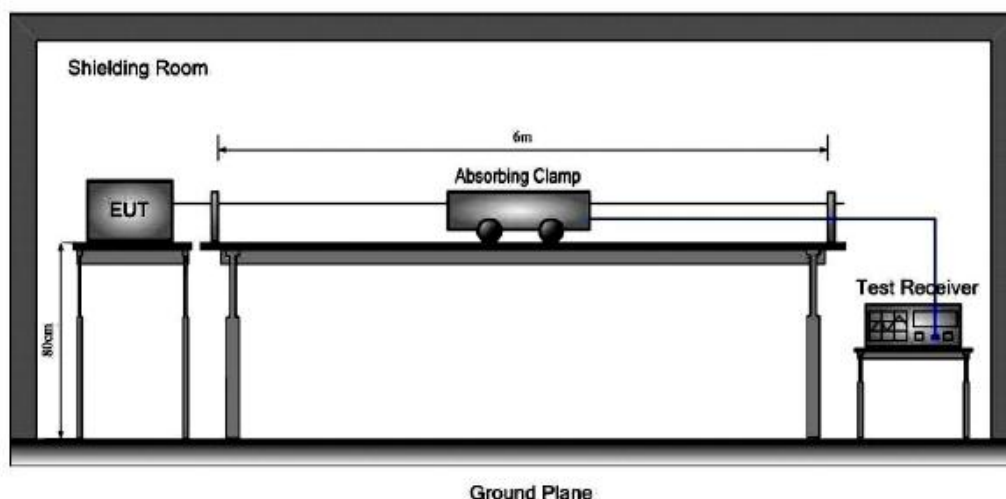
**Result** : N/A  
**Test Site** : 944 Shielded Room  
**Limits** : EN 55014-1

Frequency range MHz	Limits dB(pW)	
	Quasi-peak	Average
30 to 300	45 to 55	35 to 45
Note: The limit decreases linearly with the logarithm of the frequency in the range 30 MHz to 300MHz		
Margin (dB)		
200 to 300	0 to 10 dB	--
NOTE: 1) All the measurement result are lower than the applicable limits minus the corresponding margin ; or the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector. 2) No clock frequency or oscillator frequency of the EUT is more than or equal to 30 MHz. 3) The measured result at a particular frequency shall be less than the relevant limit minus the corresponding margin (at that frequency).		

#### Test Specification

1. The EUT was placed on a non-metallic table of 0.8 m of height above the floor and at least 0.4 m from other metallic objects and from any person.
2. The lead to be measured was stretched in a straight horizontal line for a length sufficient to accommodate the absorbing clamp and to permit the necessary adjustment of its position for tuning. The absorbing clamp was placed around the lead to be measured, with its current transformer towards the EUT, so as to measure a quantity proportional to the disturbance power on the lead.
3. At each test frequency the absorbing clamp was moved along the lead until the maximum value was found between a position adjacent to the EUT and a distance of about a half wavelength from it. The connected leads were extended to have a length of 6 m.
4. The bandwidth of the test receiver was set at 120 kHz.
5. All the test data were reported on the following page.

#### Test Set-up



#### 4.5. Radiated Emission Test (below 1 GHz)

**Result** : **PASS**  
**Test Site** : 966 Chamber  
**Limits** : EN 55014-1

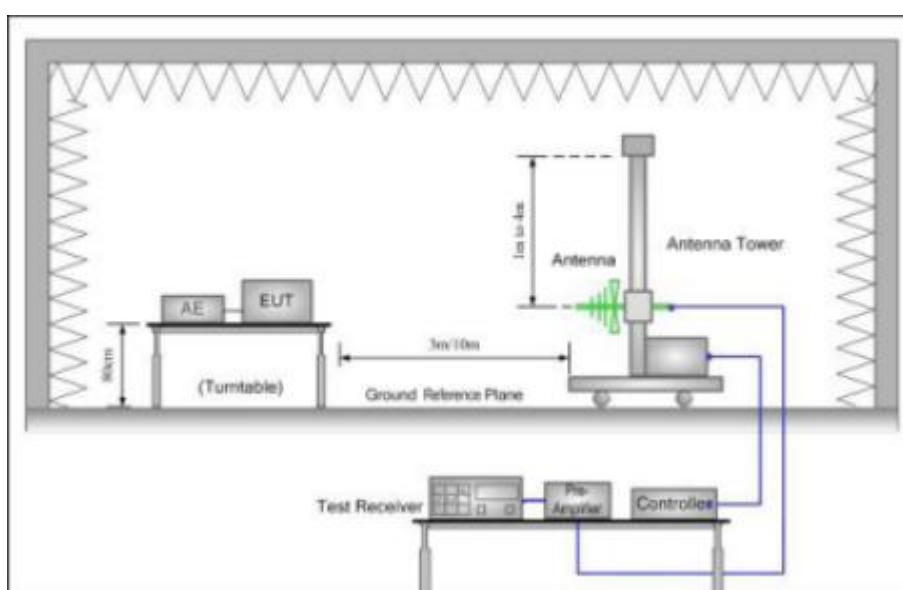
Frequency range MHz	Quasi-peak limits dB(μV/m)
30-230	40
230-1000	47

Note: 1. The lower limit shall apply at the transition frequency.  
 2. Additional provisions may be required for cases where interference occurs.

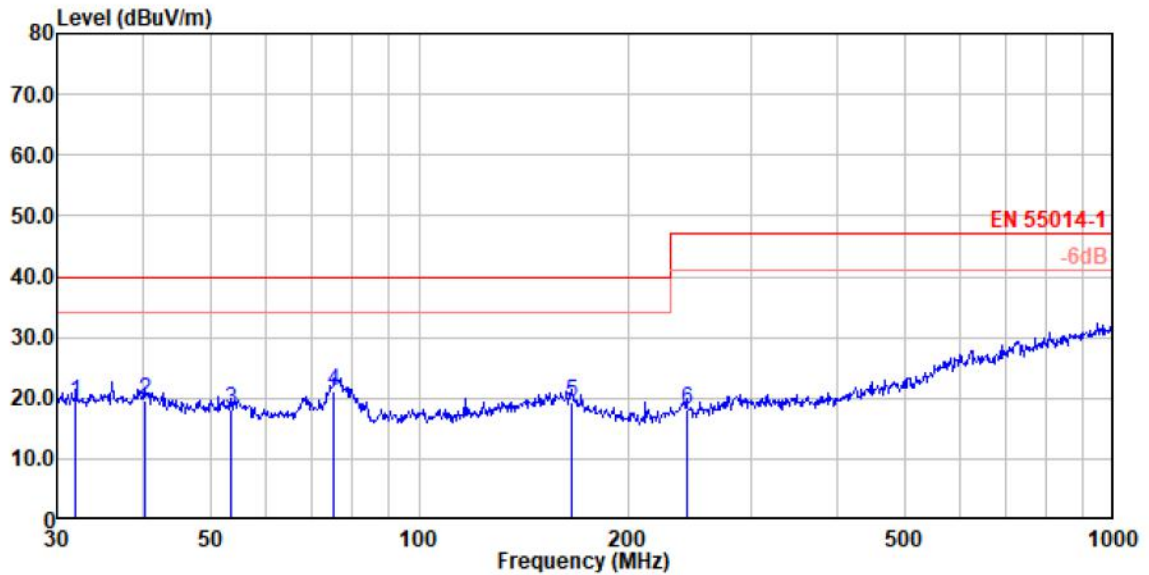
#### Test Specification

1. The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.
2. The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.
3. The bandwidth setting on the test receiver was 120 kHz.
4. All the test data were reported on the following pages.
5. Emission Level = Antenna Factor + Cable Loss + Meter Reading - Preamp Factor.

#### Test Set-up

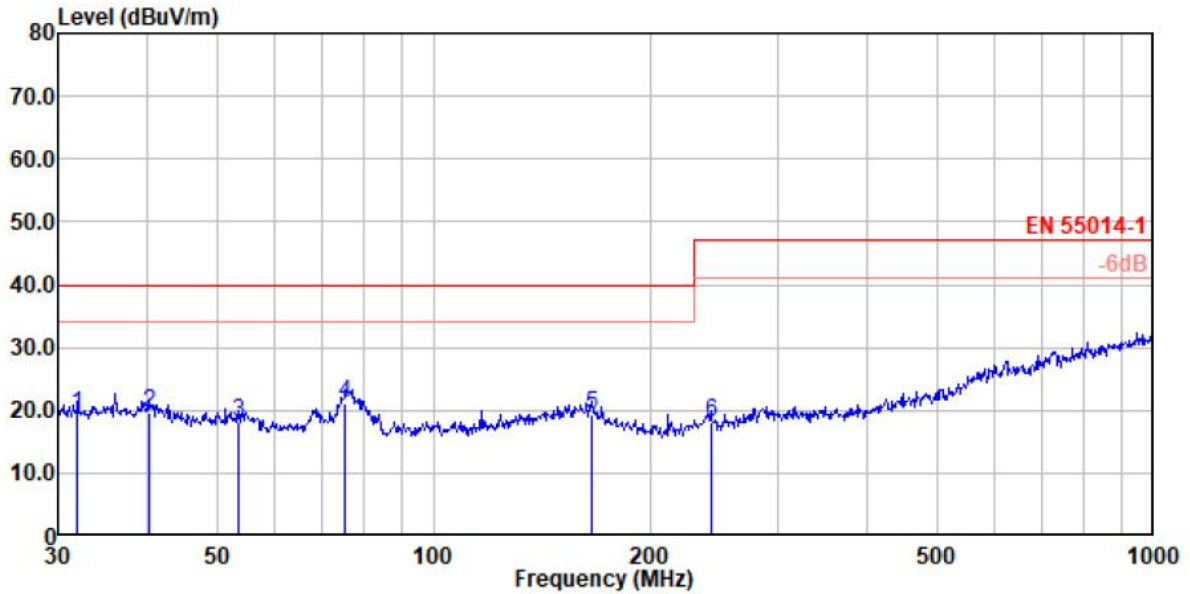


M/N : 6649  
 Operation Mode : Mode 1  
 Test Voltage : 4.65-5.3VDC  
 Test Specification : Vertical  
 Temperature (° C) : 24.9    Relative Humidity (%) : 56    Atmospheric Pressure(mbar) : 1015



	Freq	Cable Loss	Factor	Level	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dBuV/m	dBuV	dBuV/m	dB	
1	31.955	3.34	15.64	19.41	3.77	40.00	-20.59	QP
2	40.135	3.16	16.41	19.74	3.33	40.00	-20.26	QP
3	53.318	2.08	14.79	18.07	3.28	40.00	-21.93	QP
4	75.182	4.37	13.90	21.25	7.35	40.00	-18.75	QP
5	165.487	1.48	14.07	19.30	5.23	40.00	-20.70	QP
6	242.525	2.73	13.25	18.01	4.76	47.00	-28.99	QP

M/N : 6649  
 Operation Mode : Mode 1  
 Test Voltage : 4.65-5.3VDC  
 Test Specification : Horizontal  
 Temperature (° C) : 24.9    Relative Humidity (%) : 56    Atmospheric Pressure(mbar) : 1015



	Freq	Cable Loss	Factor	Level	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dBuV/m	dBuV	dBuV/m	dB	
1	31.955	3.34	15.64	19.41	3.77	40.00	-20.59	QP
2	40.135	3.16	16.41	19.74	3.33	40.00	-20.26	QP
3	53.318	2.08	14.79	18.07	3.28	40.00	-21.93	QP
4	75.182	4.37	13.90	21.25	7.35	40.00	-18.75	QP
5	165.487	1.48	14.07	19.30	5.23	40.00	-20.70	QP
6	242.525	2.73	13.25	18.01	4.76	47.00	-28.99	QP

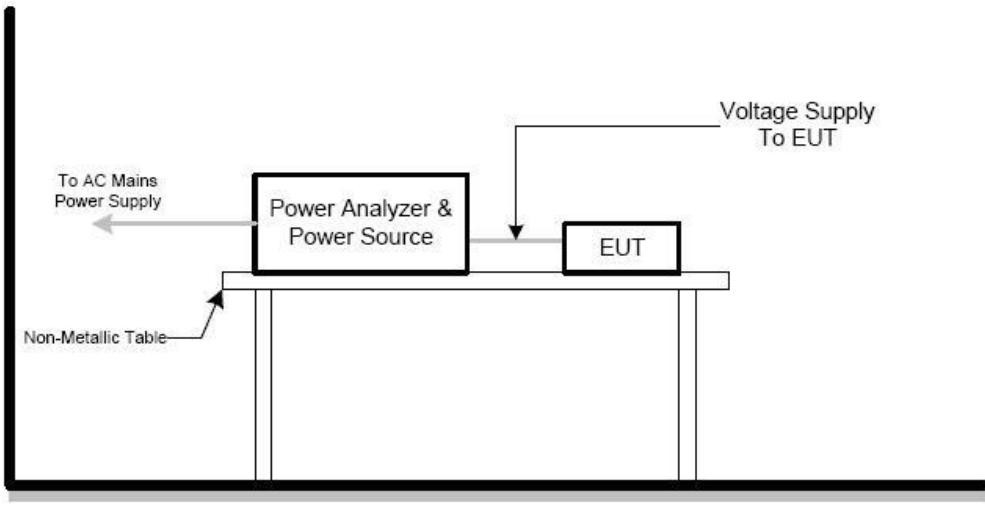
#### 4.6. Harmonic Current Emissions on AC Mains Test

**Result** : N/A

**Limits** : EN 61000-3-2 Class A

**Test Set-up**

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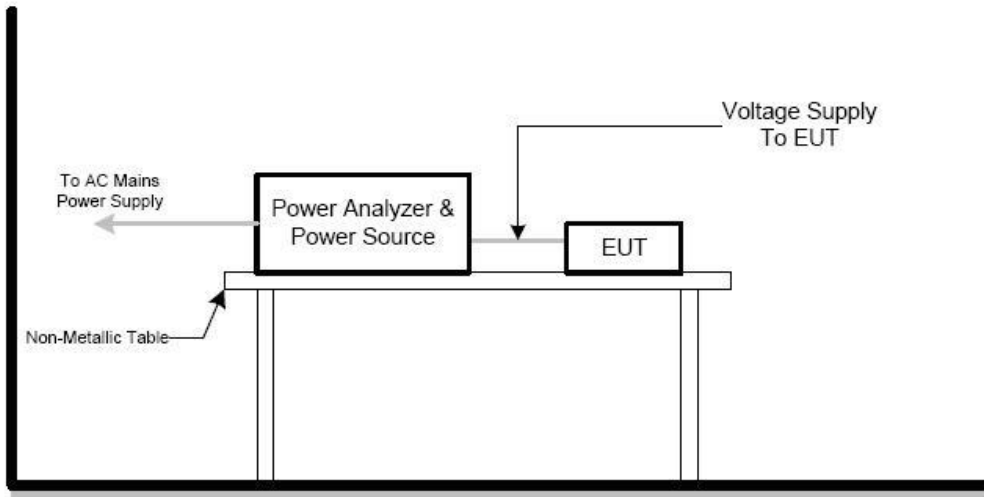




#### 4.7.Voltage Fluctuations and Flicker on AC Mains Test

**RESULT** : N/A  
Limits : EN 61000-3-3  
Test Set-up

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## 5. IMMUNITY TEST RESULTS

### 5.1. Description of Performance Criteria

#### Performance criteria A

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. 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 from what the user may reasonably expect from the apparatus if used as intended.

#### Performance criteria B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. 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 from what the user may reasonably expect from the apparatus if used as intended.

#### Performance criteria C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

#### Classification of the EUT

- Category I      apparatus containing no electronic control circuitry.
- Category II      ESD    EFT    SURGE    C/S      DIPS
- Category III      ESD    RS
- Category IV      ESD    RS    EFT      SURGE    C/S      DIPS
- : Used.
- : Not Used.

## 5.2. Electrostatic Discharge Immunity Test

<b>Result</b>	: <b>Pass</b>
Test Procedure	: EN 55014-2
Test Specification	: $\pm 4$ kV (Contact discharge); $\pm 8$ kV (Air discharge)
Number of Discharges	: 10 (Air discharge for single polarity discharge) 10 (Contact discharge for single polarity discharge)
Repetition Rate	: One discharge per second
Performance Criterion	: B
Test Site	: LAB 1

### Test Specification

The EUT was put on a 0.8m high wooden table/0.1m high for floor standing equipment standing on the ground reference plane (GRP) 3m by 2m in size, made by iron 1.0 mm thick.

A horizontal coupling plane (HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size & HCP were constructed from the same material type & thickness as that of the GRP, and connected to the GRP via a 470k $\Omega$  resistor at each end.

The distance between EUT and any of the other metallic surface excepted the GRP, HCP & VCP was greater than 1m.

The EUT was arranged and connected according to its functional requirements.

Direct static electricity discharges was applied only to those points and surface which are accessible to personnel during normal usage

On each preselected points 10 times of each polarity single discharge were applied The time interval between successive single discharges is at least 1s.

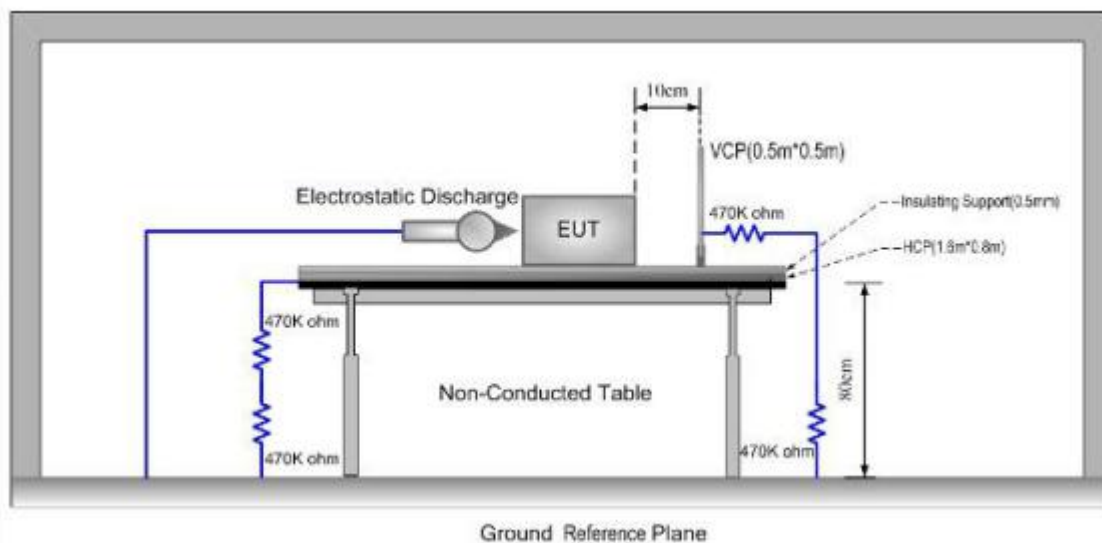
The ESD generator was held perpendicular to the surface to which the discharge is applied. The discharge return cable of the generator was kept at a distance of 0.2m whilst the discharge is being applied. During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

Indirect discharge was conducted to objects placed near the EUT, simulated by applying the discharges of the ESD generator to a coupling plane, in the contact discharge mode.

After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a grounded carbon fibre brush with bleeder resistors (2 $\times$ 470 k $\Omega$ ) in the grounding cable was used after each discharge to remove remnant electrostatic voltage.

10 times of each polarity single discharge were applied to HCP and VCP. The detail selected points are listed in the following table.

Test Set-up



Test data

M/N : 6649

Operation Mode : Mode 1

Test Voltage : 4.65-5.3VDC

Temperature (° C) : 24.9      Relative Humidity (%) : 56      Atmospheric Pressure(mbar) : 1015

Discharge Location		Type of Discharge	Result
HCP	4 points	Contact	Pass
VCP	4 points	Contact	Pass
Slot	4 points	Air	Pass
Keyswitch	1 point	Air	Pass

*Remark: 1. No obvious change of function was found after the test.  
 2. Discharge should be considered on Contact, Air, Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).*

### 5.3. Radio Frequency Electromagnetic Field Immunity Test

<b>Result</b>	<b>: Pass</b>
Test Procedure	: EN 55014-2
Test Field Strength	: 3 V/m (unmodulated)
Test Signal	: 1 kHz sine wave, AM 80% modulated
Frequency Range	: 80 to 1000 MHz
Performance Criterion	: A
Test Site	: STC

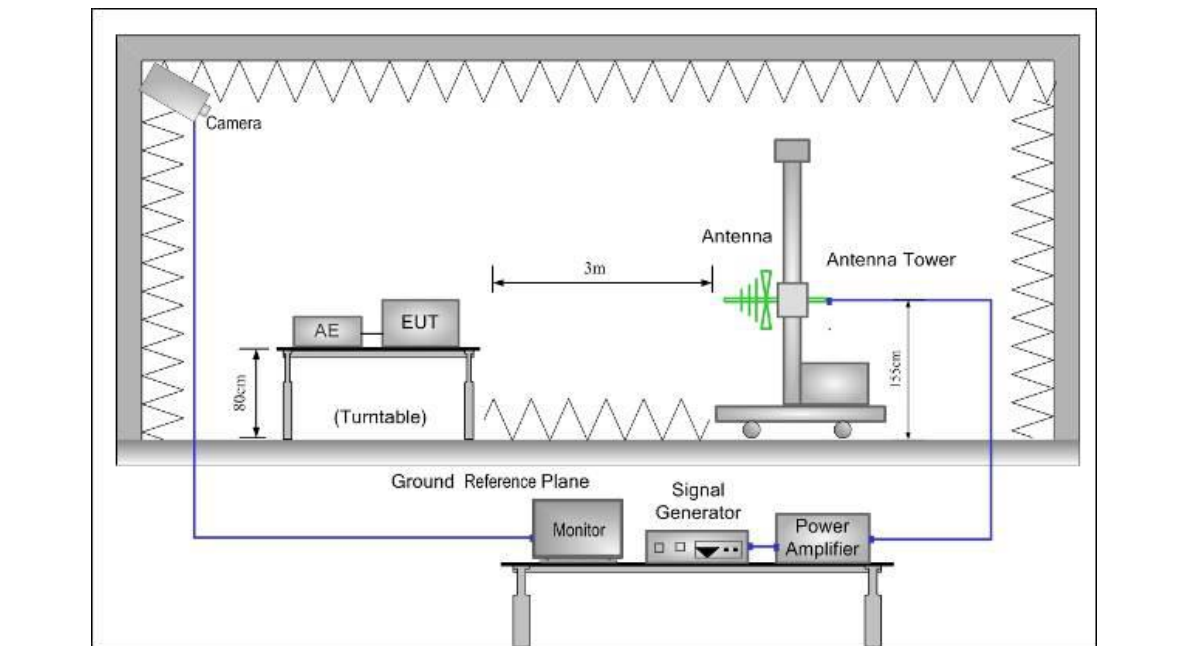
#### Test Specification

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground.

The EUT was set 3 m away from the transmitting antenna which was mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna were set on the test. Each of the four sides of the EUT was faced the transmitting antenna and measured individually.

The test was carried out in the Anechoic Chamber which was that of a size adequate to maintain a uniform field of sufficient dimensions with respect to the EUT. Additional absorbers were used to damp reflections in chambers which were not fully lined.

**Test Set-up**



**Test data**

M/N : 6649  
 Operation Mode : Mode 1  
 Test Voltage : 4.65-5.3VDC  
 Temperature (° C) : 24    Relative Humidity (%) : 56    Atmospheric Pressure(mbar) : 1015

Position	Test Level	Frequency Range	Modulated Signal	Freq. Step	Dwell Time	Result
Front	3 V/m	80 to 1000 MHz	AM 80%, 1kHz sine wave	1%	3 s	Pass
Right						Pass
Rear						Pass
Left						Pass

*Remark: The EUT was operated as intended during and after the test.*

## 5.4. Electrical Fast Transient/Burst Immunity Test

<b>RESULT</b>	: <b>N/A</b>
Test Procedure	: EN 55014-2
Performance Criterion	: B
Waveshape of the pulse	: Tr/Td = 5/50 ns
Repetition Frequency	: 5 kHz
Burst Duration	: 15 ms
Burst Period	: 300 ms
Test Duration	: 120 s
Test Site	: LAB 3

### Test Specification

The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0.1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment.

For floor standing equipment, the EUT was placed on a GRP and be insulated form it by an insulating support with a thickness of 0.1 m.

The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT were placed on the insulation support 0.1m above GRP. Cables not subject to EFT were routed as far as possible from cable under test to minimize the coupling between the cables.

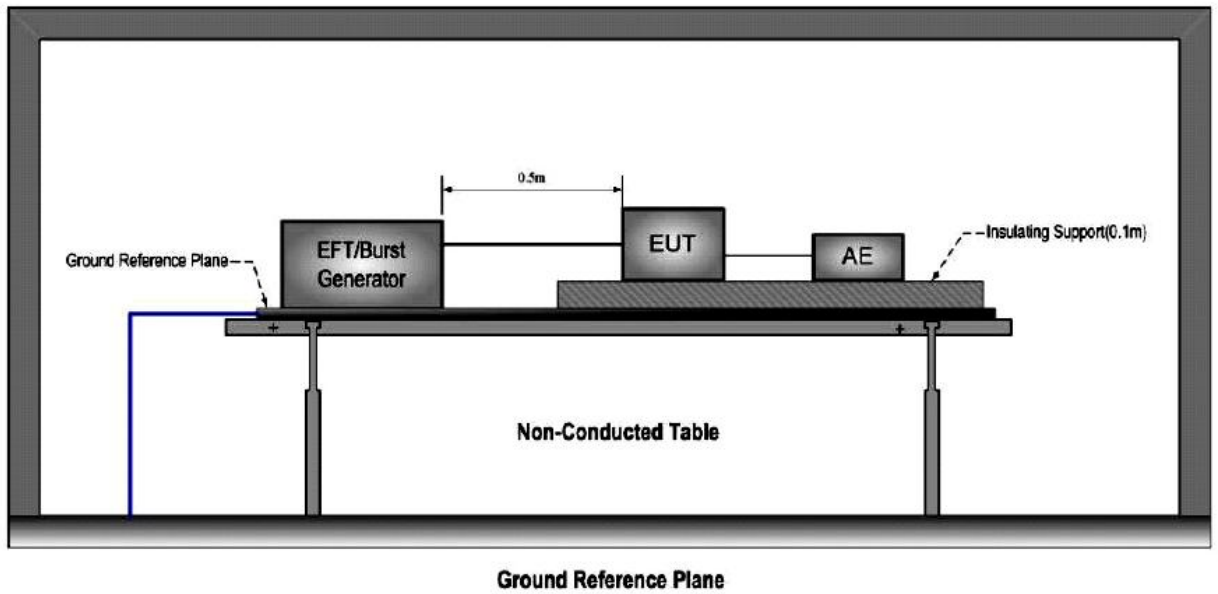
The distance between any coupling devices and the EUT shall be (0,5 - 0/+0,1) m for tabletop equipment testing, and (1,0 ± 0,1) m for floor standing equipment. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be bundled and situated at a distance of 0.1m above the GRP.

The EUT was conducted the below specified level voltage test for line to neutral or line to neutral to earth (for clamp coupling is for the signal line), 120 seconds duration.

If the equipment contains identical ports, only one was tested; multi-conductor cables, such as a 50-pair telecommunication cable, were tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.

The coupling Clamp was used for measurements on signal ports.

**Test Set-up**



**Test data**

M/N : 6649

Operation Mode : Mode 1

Test Voltage : 4.65-5.3VDC

Temperature (° C) : 24.9 Relative Humidity (%) : 56 Atmospheric Pressure(mbar) : 1015

Coupling Ports			Coupling Voltage	Inject Method	Result
AC Power Ports	L	<input checked="" type="checkbox"/>	±1 kV	Direct	N/A
	N	<input checked="" type="checkbox"/>	±1 kV		N/A
	L-N	<input checked="" type="checkbox"/>	±1 kV		N/A
	PE	<input checked="" type="checkbox"/>	±1 kV		N/A
	L-PE	<input checked="" type="checkbox"/>	±1 kV		N/A
	N-PE	<input checked="" type="checkbox"/>	±1 kV		N/A
	L-N-PE	<input checked="" type="checkbox"/>	±1 kV		N/A
DC line		<input type="checkbox"/>	±0.5 kV	Clamp	N/A

*Remark: No obvious change of function was found after the test.*



## 5.5.Surge Immunity Test

<b>RESULT</b>	: <b>N/A</b>
Test Procedure	: EN 55014-2
Performance Criterion	: B
Waveform Parameters	: Open-circuit voltage: 1.2/50 $\mu$ s Short-circuit current: 8/20 $\mu$ s
Test Site	: LAB 3

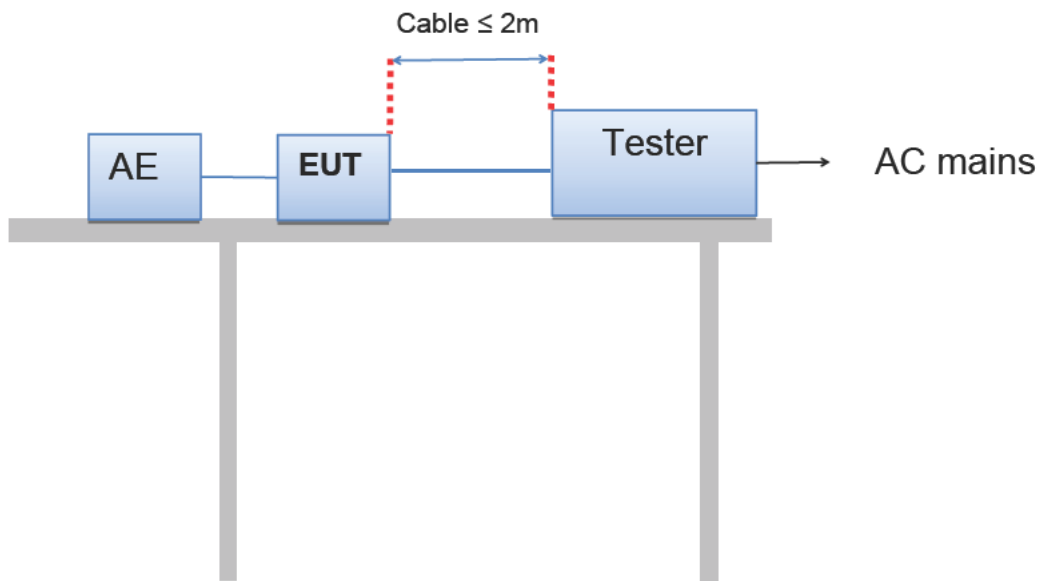
### Test Specification:

The effective output impedance of the generator was 2  $\Omega$  for L-N test, and 12  $\Omega$  for L-PE and N-PE test.

For d.c. power ports and interconnection lines, the surge pulses were 5 positive and 5 negative. For a.c. power ports, the surge pulses were 5 positive 90° and 5 negative at 270°. The time between successive pulses was 1 minute.

For double-insulated products without PE or external earth connections, the test was done in a similar way as for grounded products but without additional external grounded connections. If there were no other possible connections to earth, line-to-ground tests were omitted. The power cord or/and interconnection line between the EUT and the coupling/decoupling network was less than 2 m in length.

### Test Set-up



### Test data

M/N : 6649  
 Operation Mode : Mode 1  
 Test Voltage : 4.65-5.3VDC  
 Temperature (° C) : 24.9    Relative Humidity (%) : 56    Atmospheric Pressure(mbar) : 1015

Coupling Ports			Repetition Rate	Coupling Voltage	Coupling Phase / Result			
					0°	+90°	180°	-270°
AC power ports	L-N	<input checked="" type="checkbox"/>	60 s	1 kV	-	-	-	-
	L-PE	<input checked="" type="checkbox"/>	60 s	2 kV	-	-	-	-
	N-PE	<input checked="" type="checkbox"/>	60 s	2 kV	-	-	-	-

*Remark: No obvious change of function was found after the test.*

## 5.6. Injected Currents Susceptibility Test

<b>RESULT</b>	: <b>N/A</b>
Test Procedure	: EN 55014-2
Test Voltage	: 3 V (r.m.s) unmodulated
Test Signal	: 1kHz sine wave, AM 80% modulated
Frequency Range	: 150 kHz to 230 MHz
Performance Criterion	: A
Test Site	: LAB 1

### Test Specification:

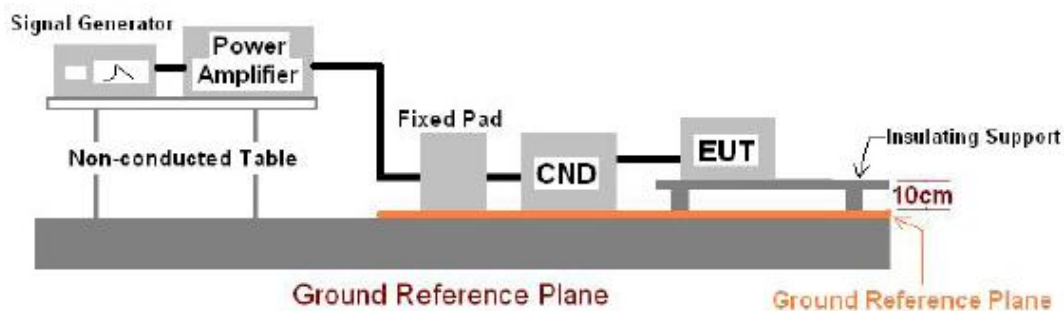
The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.

The coupling and decoupling devices were required, they were located between 0.1m and 0.3m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.

Each AE, used with clamp injection, shall be placed on an insulating support 0.1m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0.3m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane.

The frequency range was swept from 150 kHz to 230 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size do not exceed 1% of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.

### Test Set-up



### Test data

M/N : 6649  
 Operation Mode : Mode 1  
 Test Voltage : 4.65-5.3VDC  
 Temperature (° C) : 24.9    Relative Humidity (%) : 56    Atmospheric Pressure(mbar) : 1015

Coupling ports	Voltage (r.m.s)	Frequency Range	Modulation Signal	Freq. Step	Dwell Time	Coupling Method	Result
AC Power Ports	3 V	150 kHz to 80 MHz	AM 80%, 1kHz sine	1%	1.5 s	CDN	N/A
Signal line	3 V	150 kHz to 80 MHz	AM 80%, 1kHz sine	1%	1.5 s	CDN	N/A

*Remark: The EUT was operated as intended during and after the test.*

## 5.7.Voltage Dips and Short Interruptions Immunity Test

<b>RESULT</b>	: <b>N/A</b>
Test Procedure	: EN 55014-2
Criterion	: C
Test Specification	: 0% of UT (Supply Voltage) for 0.5 Periods 40 % of UT (Supply Voltage) for 10 Periods 70 % of UT (Supply Voltage) for 25 Periods
Test Site	: LAB 4

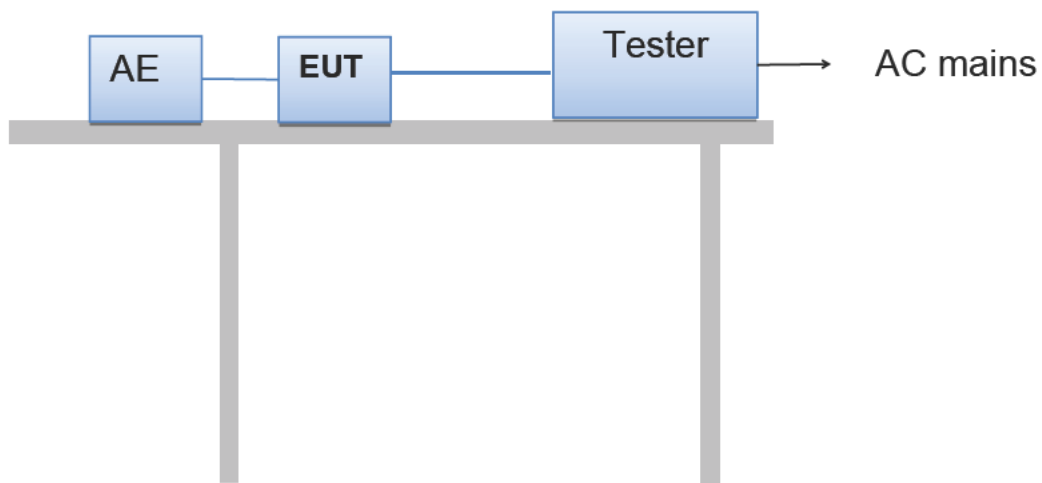
### Test Specification

The test was performed with the EUT connected to the test generator with the shortest possible length suitable to the application of the EUT.

The EUT was tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s (between each test event). Each representative mode of operation was to be tested.

For voltage dips and short interruptions, changes in supply voltage were to occur at zero crossings of the voltage.

### Test Set-up



### Test data

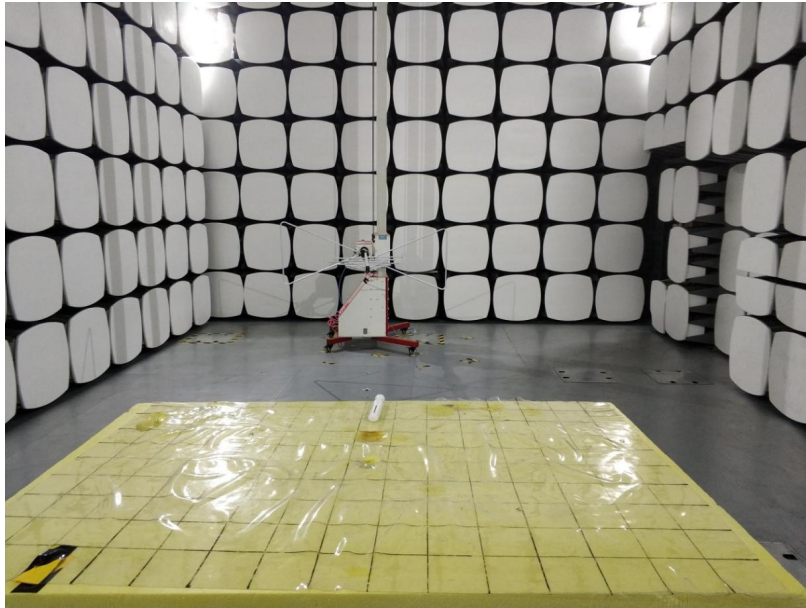
M/N : 6649  
 Operation Mode : Mode 1  
 Test Voltage : 4.65-5.3VDC  
 Temperature (° C) : 24.9    Relative Humidity (%) : 56    Atmospheric Pressure(mbar) : 1015

Test Level in % $U_T$	Voltage Dips & Short Interruptions in % $U_T$	Durations (in Period)	Criterion	Result
0	100	0.5 P	C	N/A
40	60	10 P	C	N/A
70	30	25 P	C	N/A

*Remark: No obvious change of function was found after the test.*

## 6. PHOTOGRAPHS OF TEST SET-UP

Radiated Emission Test

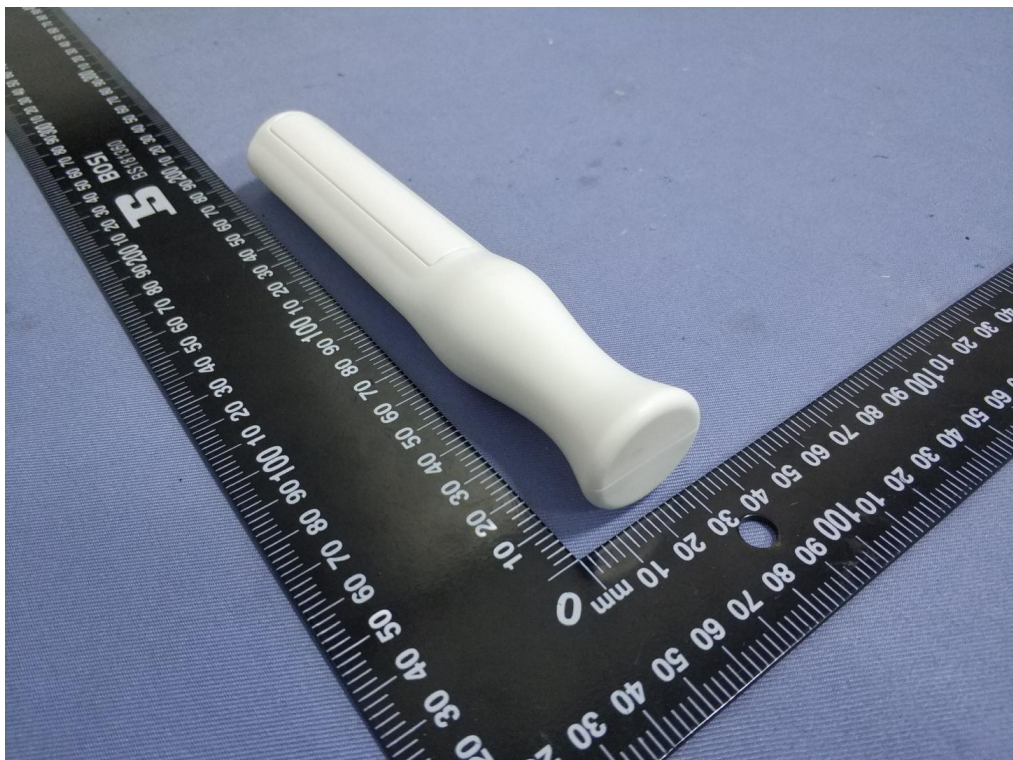
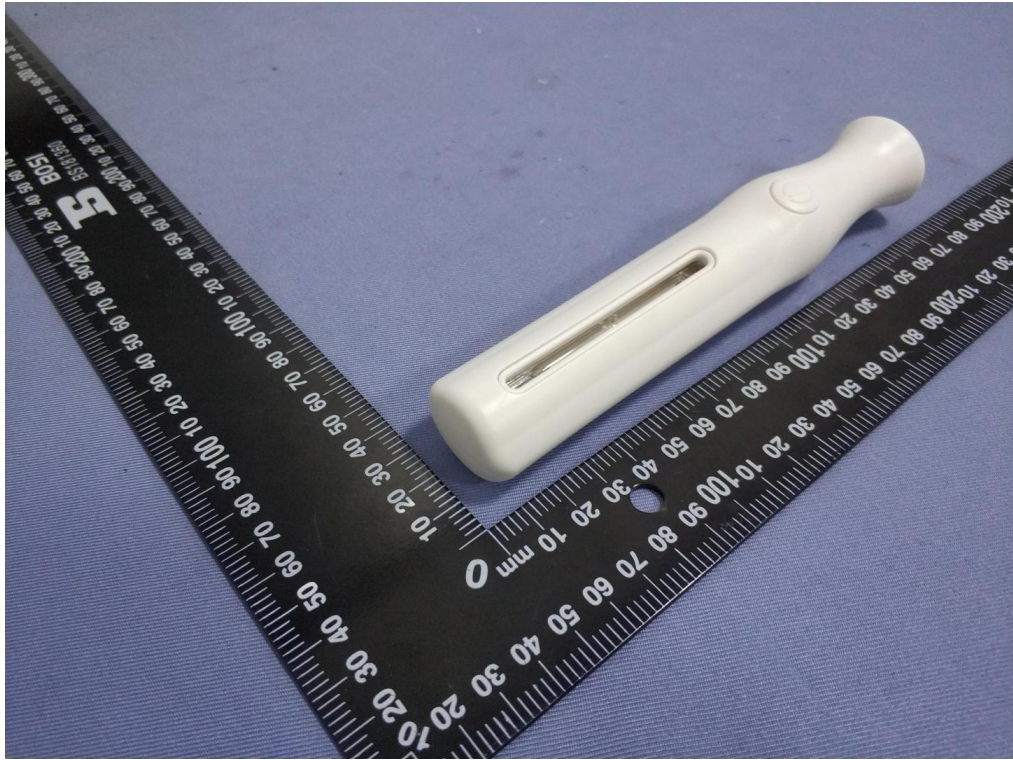


Electrostatic Discharge Immunity Test

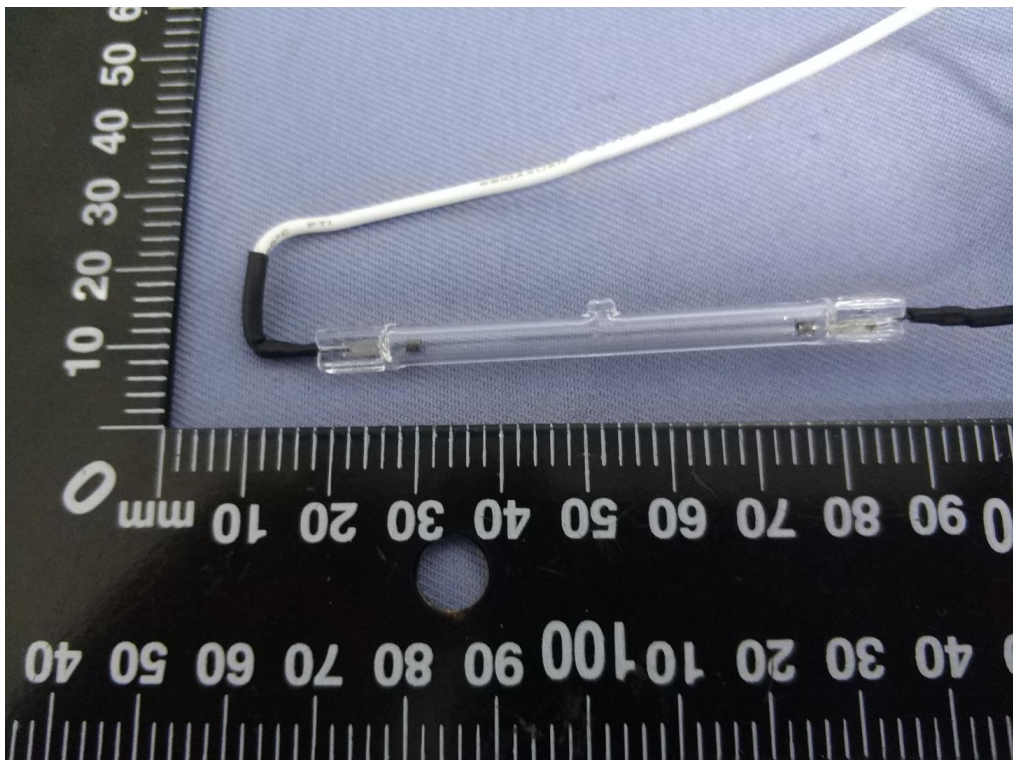
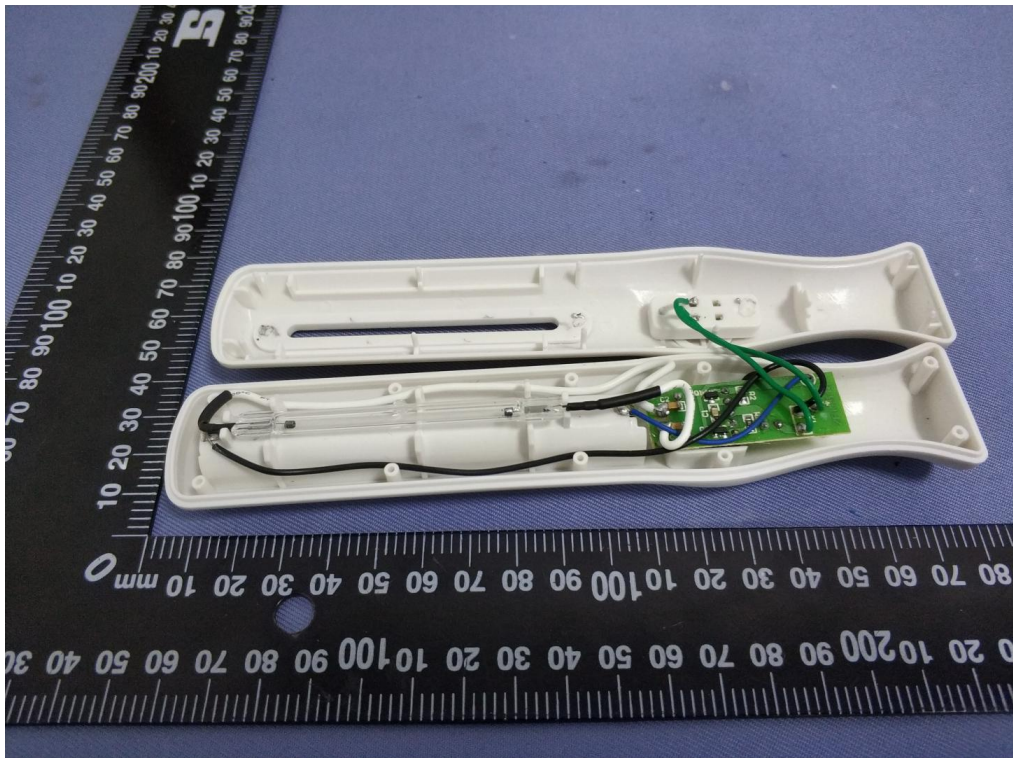


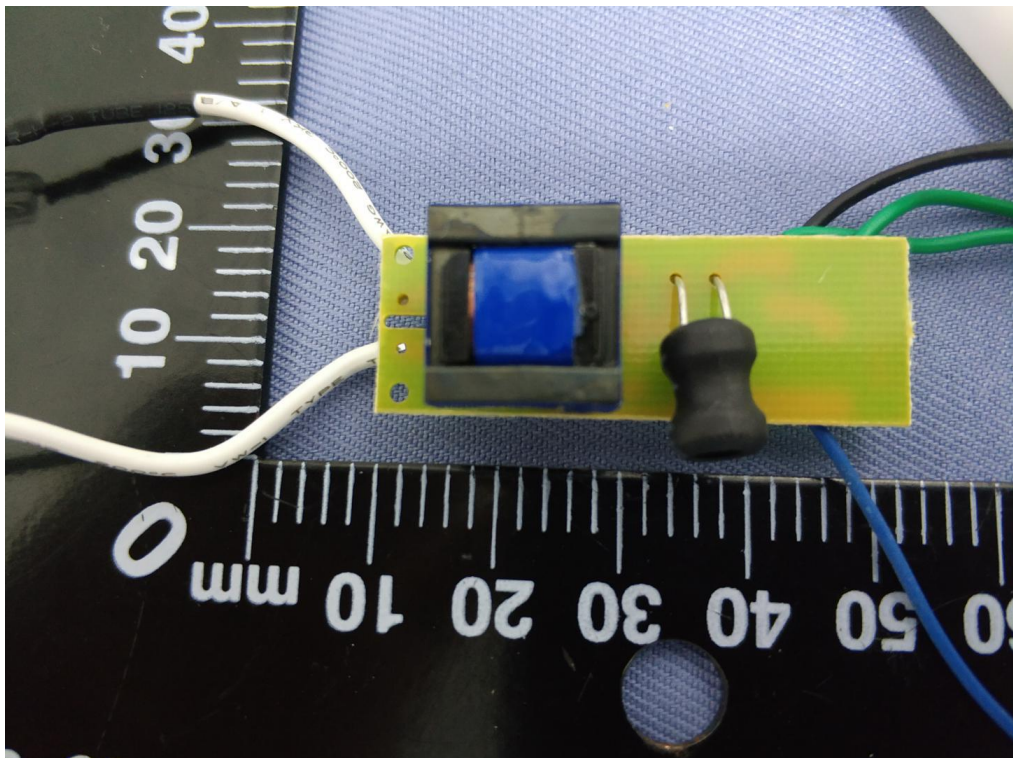
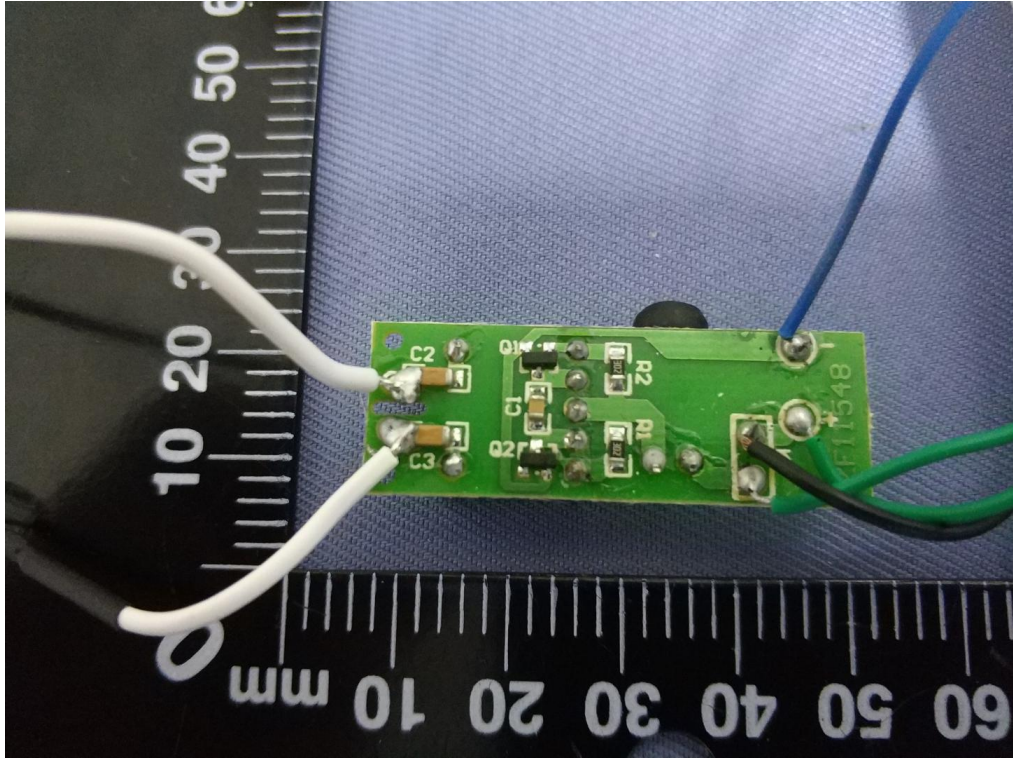


## 7. PHOTOGRAPHS OF THE EUT









\*\*\* The end of report \*\*\*