

# EMC TEST REPORT

**Report No.: ST20170612002-R**

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Applicant's Name .....	Smart Team Holdings Limited
Address .....	Flat A01, 5/F., Great Wall Factory Building, 11 Cheung Shun St., Lai Chi Kok, Kowloon, HK
Manufacturer .....	Shenzhen Smart Team Technology Limited
Address .....	Xutai Industrial Zone, Long Wo Road, Long Tian Village, Keng Zi Town, Longgang District, Shenzhen, Guangdong, China
Standard.....	EN 55014-1:2006+ A1:2009+A2:2011 EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55014-2:2015
Product .....	UVC Sterilizer & Plasma Ion Air Purifier
Trademark .....	CSTT
Test Model .....	Ai202
Additional Model .....	N/A
Test date .....	Jun. 12-14, 2017
Date of report .....	Jun.14, 2016
Tested By:.....	David Luo
Approved & Authorized Signer:.....	David Luo



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## TEST REPORT DECLARATION

Applicant	:	Smart Team Holdings Limited
Address	:	Flat A01, 5/F., Great Wall Factory Building, 11 Cheung Shun St., Lai Chi Kok, Kowloon, HK
EUT Description	:	UVC Sterilizer & Plasma Ion Air Purifier
Model Number	:	Ai202

### Test Standards:

EN 55014-1:2006+ A1:2009+A2:2011

EN 61000-3-2:2014

EN 61000-3-3:2013

EN 55014-2:2015

The EUT described above is tested by ST Technology Co., Ltd. EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. ST Technology Co., Ltd. EMC Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/30/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

## 1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	Test Results
Power Line Conducted Emission Test	PASS
Disturbance Power Test	PASS
Harmonic Current Emission Test	PASS
Voltage Fluctuations & Flicker Test	PASS
Electrostatic Discharge Test	PASS
RF Field Strength Susceptibility Test	PASS
Electrical Fast Transient/Burst Test	PASS
Surge Test	PASS
Injected Currents Susceptibility Test	PASS
Voltage Dips And Interruptions Test	PASS

## 2. GENERAL INFORMATION

### 2.1. Report information

- 2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that ST approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that ST in any way guarantees the later performance of the product/equipment.
- 2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, ST therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through ST, unless the applicant has authorized ST in writing to do so.

### 2.2. 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 %.

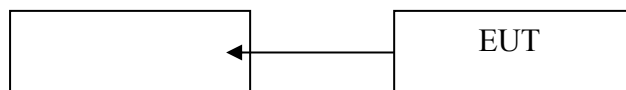
No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated (<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated (>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$

### 3. PRODUCT DESCRIPTION

#### 3.1.EUT Description

Description	:	UVC Sterilizer & Plasma Ion Air Purifier
Applicant	:	Smart Team Holdings Limited Flat A01, 5/F., Great Wall Factory Building, 11 Cheung Shun St., Lai Chi Kok, Kowloon, HK
Manufacturer	:	Shenzhen Smart Team Technology Limited Xutai Industrial Zone, Long Wo Road, Long Tian Village, Keng Zi Town, Longgang District, Shenzhen, Guangdong, China
Model Number	:	Ai202

#### 3.2.Block Diagram of EUT Configuration



#### 3.3.Operating Condition of EUT

Test mode 1: RUNNING

#### 3.4.Test Conditions

Temperature: 20-26℃

Relative Humidity: 50-68 %

#### 3.5.Modifications

No modification was made.



### 3.6. Abbreviations

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
IF	Intermediate Frequency
RF	Radio Frequency
rms	root mean square
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility

### 3.7. Performance Criterion

**Criterion A:** 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.

**Criterion B:** After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended.

**Criterion C:** 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.

## 4. TEST EQUIPMENT USED

### 4.1. For Conducted Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS30	828985/018	Sep. 20, 16	1 Year
2.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	Sep. 20, 16	1 Year
3.	L.I.S.N.	Rohde & Schwarz	ESH2-Z5	834549/005	Sep. 20, 16	1 Year
4.	Conical	Emtek	N/A	N/A	N/A	N/A
5.	Voltage Probe	Schwarzbeck	TK9416	N/A	Sep. 20, 16	1 Year
6.	Coaxial Switch	Anritsu	MP59B	6100214550	Sep. 20, 16	1 Year

### 4.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS30	828985/018	Sep. 20, 16	1 Year
2.	Power Clamp	Rohde & Schwarz	MDS21	833711/025	Sep. 20, 16	1 Year
3.	Coaxial Switch	Anritsu	MP59B	6100214550	Sep. 20, 16	1 Year

### 4.3. For Harmonic / Flicker Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Power Frequency test system	HAEFELY	PHF555	080419-03	Oct. 13, 16	1 Year

### 4.4. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	HAEFELY	PSD 1600	H911'292	Oct. 13, 16	1 Year

### 4.5. For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	HP	8648A	3633A02081	Oct. 13, 16	1 Year
2.	Amplifier	A&R	500A100	17034	NCR	NCR
3.	Amplifier	A&R	100W/1000M1	17028	NCR	NCR
4.	Isotropic Field Monitor	A&R	FM2000	16829	NCR	NCR
5.	Isotropic Field Probe	A&R	FLW220100	16755	Oct. 13, 16	1 Year
6.	Biconic Antenna	EMCO	3108	9507-2534	NCR	NCR
7.	Log-periodic Antenna	A&R	AT1080	16812	NCR	NCR
8.	PC	N/A	486DX2	N/A	N/A	N/A

### 4.6. For Electrical Fast Transient/Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	HAEFELY	PEFT 4010	080981-16	Oct. 13, 16	1 Year

### 4.7. For Surge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Tester	HAEFELY	PSURGE4.1	080107-04	Oct. 13, 16	1 Year

#### 4.8.For Injected Currents Susceptibility Test

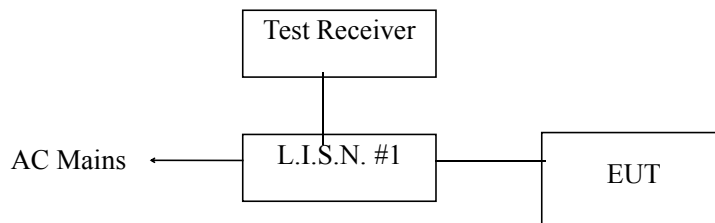
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Simulator	EMTEST	CWS 500C	0900-12	Oct. 13, 16	1 Year
2.	CDN	EMTEST	CDN-M2	510010010010	Oct. 13, 16	1 Year
3.	VDN	EMTEST	CDN-M3	0900-11	Oct. 13, 16	1 Year
4.	Injection Clamp	EMTEST	F-2031-23MM	368	Oct. 13, 16	1 Year
5.	Attenuator	EMTEST	ATT6	0010222a	Oct. 13, 16	1 Year

#### 4.9.For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	HEAFELY	PLINE 1610	083732-18	Oct. 13, 16	1 Year

## 5. POWER LINE CONDUCTED EMISSION TEST

### 5.1. Block Diagram of Test Setup



### 5.2. Test Standard

EN 55014-1:2006+ A1:2009+A2:2011

### 5.3. Power Line Conducted Emission Limit

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. \*Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

### 5.4. EUT Configuration on Test

The following equipments are installed on conducted emission test to meet EN55014-1 requirement and operating in a manner, which tends to maximize its emission characteristics in a normal application.

### 5.5. Operating Condition of EUT

5.5.1. Setup the EUT and simulators as shown in Section 5.1.

5.5.2. Turn on the power of all equipments.

5.5.3. Let the EUT work in test modes (EUT WORKING) and test it.

### 5.6. Test Procedure

The EUT is put on the ground and connected to the AC mains through a Artificial Mains Network (AMN). This provided 50ohm-coupling impedance for the tested equipments.

Both sides of AC line are checked to find out the maximum conducted emission levels according to the EN55014-1 regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESHS30) is set at 10KHz.

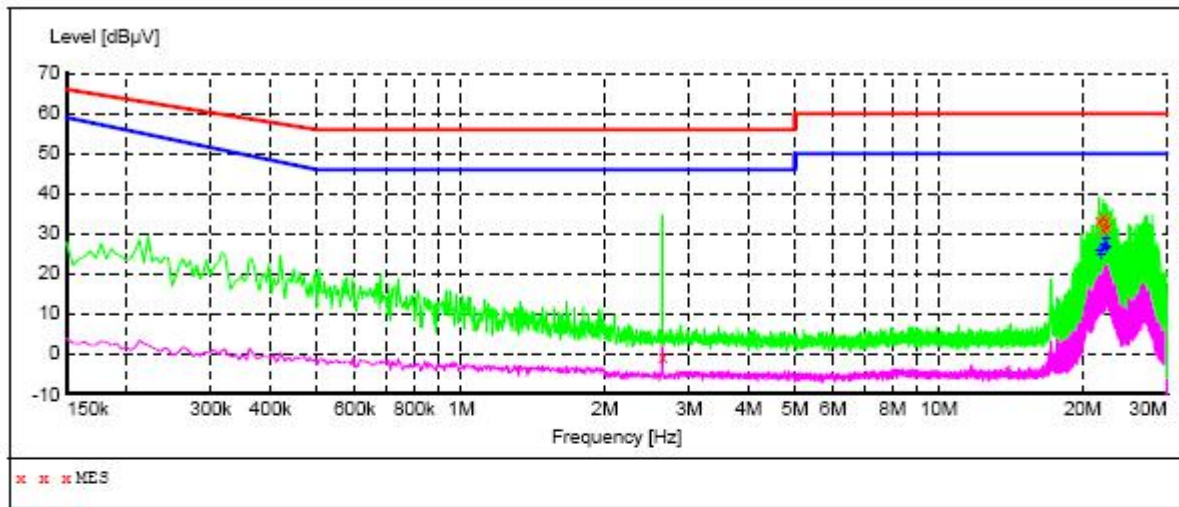
The frequency range from 150 KHz to 30 MHz is investigated.

## 5.7. Test Result

**PASS.**

Line: L

SCAN TABLE: "Voltage (9K-30M) FIN"  
 Short Description: 150K-30M Voltage

**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
2.647501	-0.70	10.4	56	56.7	QP	L1	GND
21.660001	33.10	11.0	60	26.9	QP	L1	GND
22.083001	31.40	11.0	60	28.6	QP	L1	GND
22.141501	34.10	11.0	60	25.9	QP	L1	GND
22.380001	33.10	11.0	60	26.9	QP	L1	GND
22.501501	31.60	11.0	60	28.4	QP	L1	GND

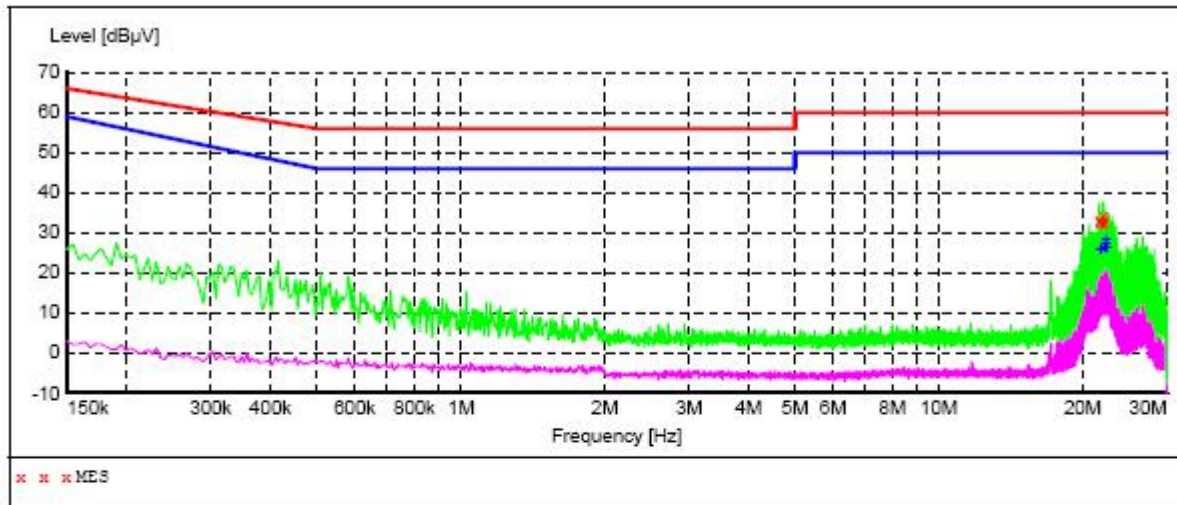
**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
21.718501	25.80	11.0	50	24.2	AV	L1	GND
21.840001	24.70	11.0	50	25.3	AV	L1	GND
22.141501	27.20	11.0	50	22.8	AV	L1	GND
22.321501	26.20	11.0	50	23.8	AV	L1	GND
22.380001	28.70	11.0	50	21.3	AV	L1	GND
22.443001	26.60	11.0	50	23.4	AV	L1	GND

Line: N

**SCAN TABLE: "Voltage (9K-30M) FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT:**

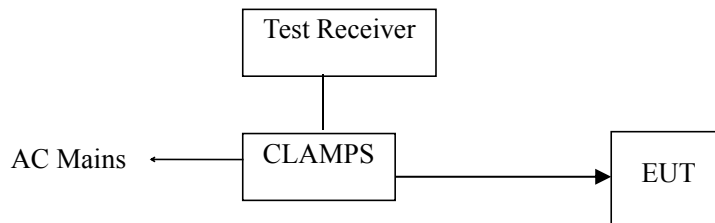
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
21.660001	33.30	11.0	60	26.7	QP	N	GND
21.718501	32.50	11.0	60	27.5	QP	N	GND
22.078501	32.70	11.0	60	27.3	QP	N	GND
22.141501	34.30	11.0	60	25.7	QP	N	GND
22.200001	32.10	11.0	60	27.9	QP	N	GND
22.263001	33.10	11.0	60	26.9	QP	N	GND

**MEASUREMENT RESULT:**

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
21.781501	25.60	11.0	50	24.4	AV	N	GND
22.141501	26.00	11.0	50	24.0	AV	N	GND
22.200001	26.20	11.0	50	23.8	AV	N	GND
22.321501	27.40	11.0	50	22.6	AV	N	GND
22.380001	28.40	11.0	50	21.6	AV	N	GND
22.443001	26.20	11.0	50	23.8	AV	N	GND

## 6. DISTURBANCE POWER TEST

### 6.1. Block Diagram of Test Setup



### 6.2. Test Standard

EN 55014-1:2006+ A1:2009+A2:2011

### 6.3. Disturbance Power Limit

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

Frequency MHz	Interference Power Limits dB(pW)	
	Quasi-peak Value	Average Value
30 ~ 300	45 Increasing Linearly with Frequency to 55 (Q.P.)	35 Increasing Linearly with Frequency to 45 (A.V.)

### 6.4. EUT Configuration on Test

The EN55014-1 regulations test method must be used to find the maximum emission during radiated emission test.

The configuration of EUT is the same as used in conducted emission test. Please refer to Section 3.2

### 6.5. Operating Condition of EUT

Same as conducted emission test, which is listed in Section 5.1., except the test set up replaced as Section 6.1.



## 6.6. Test Procedure

The EUT is placed on the ground and away from other metallic surface at least 0.4m. It is connected to the power mains through an extension cord of 6m min. The absorber clamp clamps the cord and moves from the far end to the EUT to measure the disturbing energy emitted from the cord.

The bandwidth of the test receiver(R&S ESVS30) is set at 120kHz.

All the test results are listed in Section 6.6.

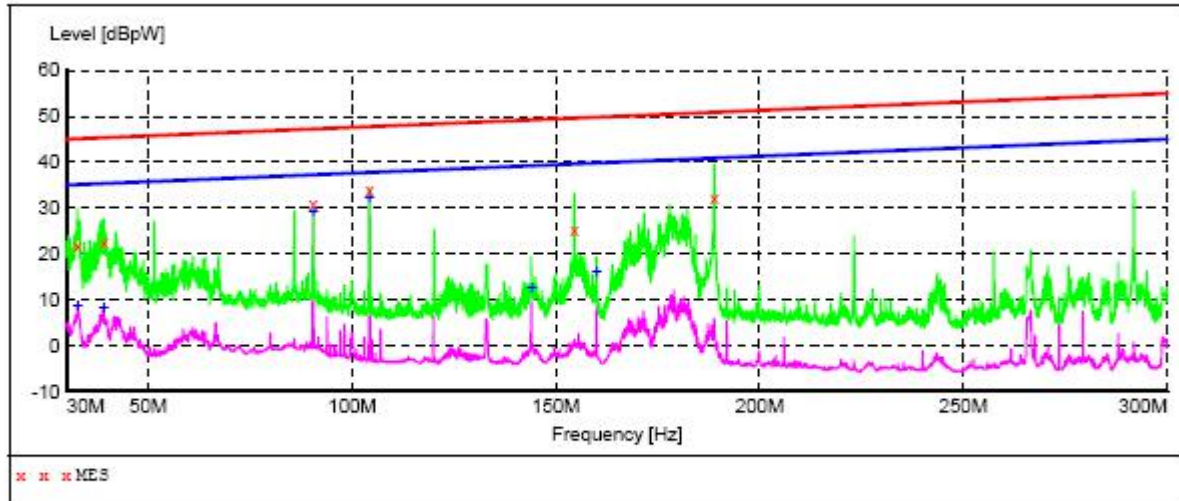
The frequency spectrum from 30 MHz to 300 MHz is investigated.

As the peak value is too low against the limit, so the quasi-peak value and average value have omitted.

## 6.7. Test Results

**PASS.**

**SCAN TABLE: "POWER(30M-300M) FIN"**  
 Short Description: EN 55013 Power



**MEASUREMENT RESULT:**

Frequency MHz	Level dBpW	Transd dB	Limit dBpW	Margin dB	Det.	Position cm
32.580000	21.60	0.8	45	23.5	QP	0.0
39.060000	22.40	1.5	45	22.9	QP	0.0
90.480000	30.90	-1.6	47	16.3	QP	0.0
104.280000	34.00	-1.0	48	13.8	QP	0.0
154.500000	25.00	-1.8	50	24.6	QP	0.0
188.820000	32.40	-2.3	51	18.5	QP	0.0

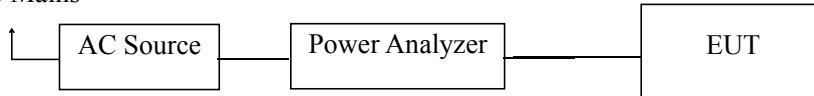
**MEASUREMENT RESULT:**

Frequency MHz	Level dBpW	Transd dB	Limit dBpW	Margin dB	Det.	Position cm
32.700000	8.50	0.8	35	26.6	AV	0.0
39.060000	8.00	1.5	35	27.3	AV	0.0
90.480000	29.00	-1.6	37	8.2	AV	0.0
104.280000	32.30	-1.0	38	5.5	AV	0.0
144.000000	12.60	-1.6	39	26.6	AV	0.0
160.020000	15.90	-1.9	40	23.9	AV	0.0

## 7. HARMONIC CURRENT EMISSION TEST

### 7.1. Block Diagram of Test Setup

AC Mains



### 7.2. Test Standard and Limit

#### 7.2.1. Test Standard

EN61000-3-2:2014

#### 7.2.2. Limits

Table 12 Harmonic Current Test Limit (Class B)

Harmonic order (n)	Maximum permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15≤n≤39	0.15×15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8≤n≤40	0.23×8/n

### 7.3. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the Power of the EUT and use the test system to test the harmonic current level.

### 7.4. Test Results

**PASS.**

## 8. VOLTAGE FLUCTUATIONS & FLICKER TEST

### 8.1. Block Diagram of Test Setup

Same as Section 7.1..

### 8.2. Test Standard

EN61000-3-3:2013

### 8.3. Operating Condition of EUT

Same as Section 7.3.. The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

Flicker Test Limit

Test items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

### 8.4. Test Data

Flicker test Data

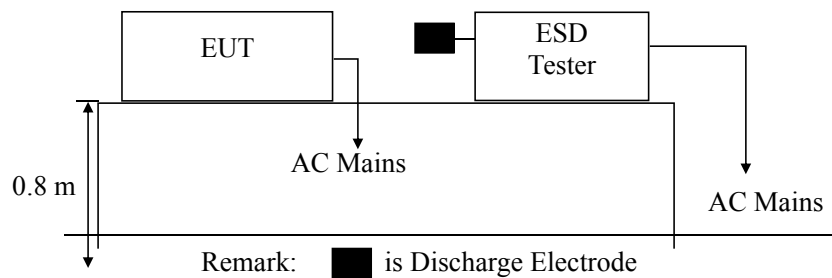
Model No.: YP-01		
Test Mode: 1		
Items	Reading	Limit
dmax	0.012	4.0%
dc	0.024	3.3%
dt	0.030	Not exceed 3.3% for 500ms
Pst	0.001	1.0

### 8.5. Test Results

**PASS.**

## 9. ELECTROSTATIC DISCHARGE TEST

### 9.1. Block Diagram of ESD Test Setup



### 9.2. Test Standard

EN 55014-2:2015 (EN 61000-4-2:2009)  
 Severity Level 3 for Air Discharge at 8KV  
 Severity Level 2 for Contact Discharge at 4KV

### 9.3. Severity Levels and Performance Criterion

#### 9.3.1. Severity level

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

#### 9.3.2. Performance criterion: B

### 9.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

### 9.5. Operating Condition of EUT

- 9.5.1. Setup the EUT as shown in Section 9.1.
- 9.5.2. Turn on the power of all equipments.
- 9.5.3. Let the EUT work in test mode (full load) and test it.

### 9.6. Test Procedure

#### 9.6.1. Air Discharge:

This test is done on a non-conductive surfaces. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT.

After each discharge, the discharge electrode shall be removed from the EUT.

The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

#### 9.6.2.Contact Discharge:

All the procedure shall be same as Section 9.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

#### 9.6.3.Indirect discharge for horizontal coupling plane

At least 20 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

#### 9.6.4.Indirect discharge for vertical coupling plane

At least 20 single discharge shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

### 9.7.Test Results

**PASS.**

Please refer to the following page.

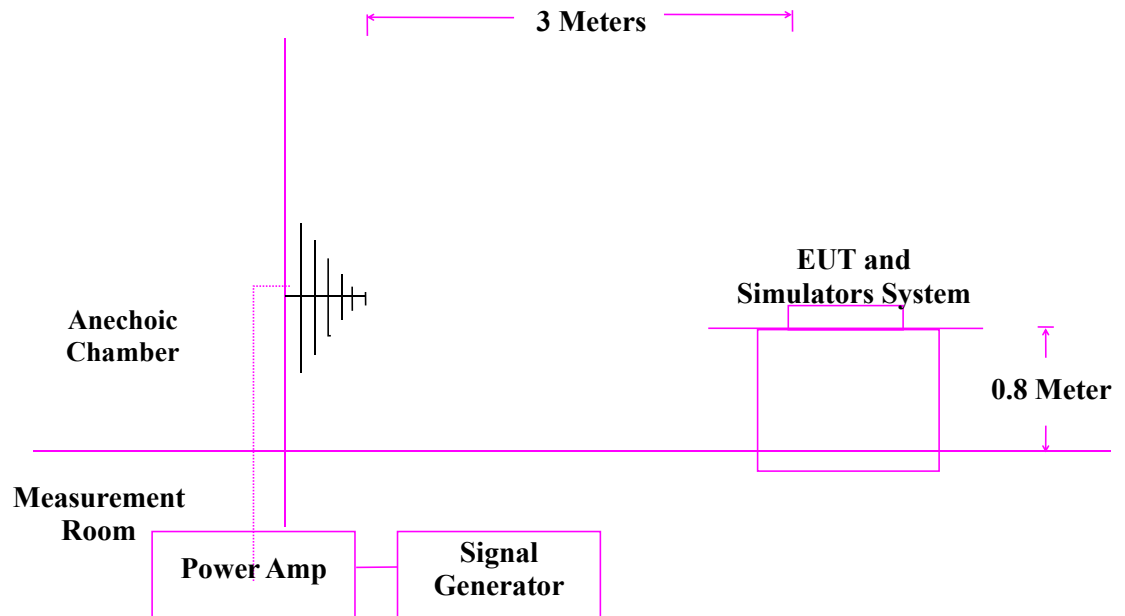
## *Electrostatic Discharge Test Results*

Test Mode: Oning			
Location	Test condition	Performance criterion	Result
Slots	Air discharge 10 time per test point Level: $\pm 2\text{KV}$ , $\pm 4\text{KV}$ , $\pm 8\text{KV}$	B	Pass
Surface		B	Pass
Port		B	Pass
Screw		B	Pass
VCP	Contact discharge 10 time per test point Level: $\pm 2\text{KV}$ , $\pm 4\text{KV}$	B	Pass
HCP		B	Pass

*Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).*

## 10.RF FIELD STRENGTH SUSCEPTIBILITY TEST

### 10.1.R/S Test Setup



### 10.2.Test Standard

EN 55014-2:2015 (EN 61000-4-3:2006+A1:2008)  
Severity Level 2 at 3V / m

### 10.3.Severity Levels and Performance Criterion

#### 10.3.1.Severity level

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

#### 10.3.2.Performance criterion : A

### 10.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.2



## 10.5.Operating Condition of EUT

Setup the EUT as shown in Section 10.1.. The operating condition of EUT are listed in section 3.3.

## 10.6.Test Procedure

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

Condition of Test	Remarks
1. Fielded Strength	3 V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80 - 1000 MHz
4. Sweeping time of radiated	0.0015 decade/s
5. Dwell Time	1 Sec.

## 10.7.Test Results

**PASS.**

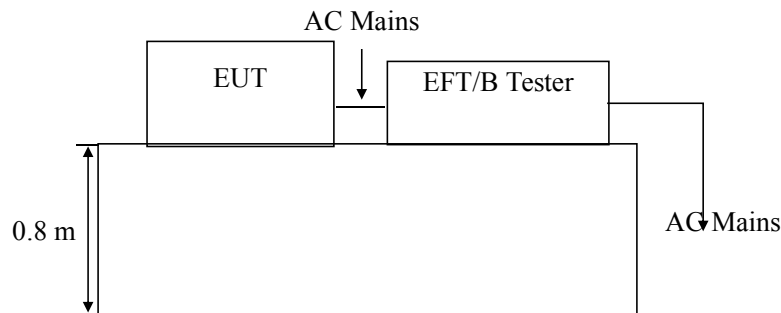
Please refer to the following page.

## *RF Field Strength Susceptibility Test Results*

Test Mode: Oning		
Criterion : A		
Frequency (MHz)	Rang	80 MHz –1GHz, 1.4GHz-2.7GHz
Field (V/m)	Strength	3V/m
Steps (%)		1%
Performance criterion: A		
	Horizontal	Vertical
Front	Pass	Pass
Right	Pass	Pass
Rear	Pass	Pass
Left	Pass	Pass

## 11.ELECTRICAL FAST TRANSIENT/BURST TEST

### 11.1.EFT Test Setup



### 11.2.Test Standard

EN 55014-2:2015 (EN 61000-4-4:2012)  
Severity Level 2 at 1KV

### 11.3.Severity Levels and Performance Criterion

#### 11.3.1.Severity level

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

#### 11.3.2.Performance criterion : B

### 11.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.2..

### 11.5.Operating Condition of EUT

Setup the EUT as shown in Section 11.1.. The operating condition of EUT are listed in section 3.3.

### 11.6.Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum

distance between the EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

11.6.1.For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

11.6.2.For signal lines and control lines ports:

It's necessary to test.

11.6.3.For DC output line ports:

It's unnecessary to test.

## 11.7.Test Results

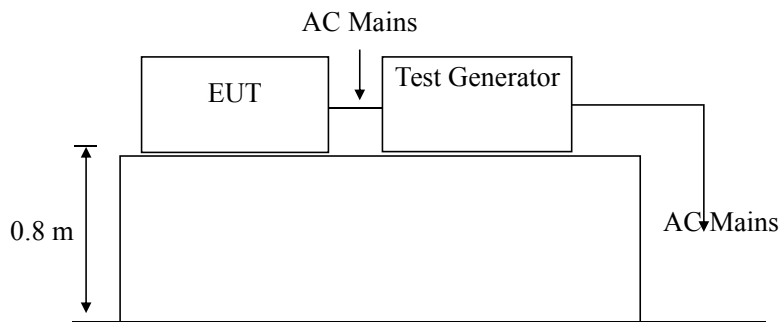
**PASS.**

### *Electrical Fast Transient/Burst Test Results*

Test Mode: Oning					
Inject Line	Voltage KV	Inject Time(s)	Inject Method	Performance criterion	Results
L	+1	60	Direct	B	PASS
	-1	60	Direct	B	PASS
N	+1	60	Direct	B	PASS
	-1	60	Direct	B	PASS
L N	+1	60	Direct	B	PASS
	-1	60	Direct	B	PASS

## 12.SURGE TEST

### 12.1.Surge Test Setup



### 12.2.Test Standard

EN 55014-2:2015 (EN 61000-4-5:2006)  
Severity Level 2 for Line to Neutral at 1.0KV

### 12.3.Severity Levels and Performance Criterion

#### 12.3.1.Severity level

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

Performance criterion : C

### 12.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

### 12.5.Operating Condition of EUT

12.5.1.Setup the EUT as shown in Section 12.1..

12.5.2.Turn on the power of all equipments.

12.5.3.Let the EUT work in test mode (Full load) and test it.

### 12.6.Test Procedure

- 1) Setup the EUT and test generator as shown on Section 12.1.
- 2) For line to line coupling mode, provide a 0.5KV 1.2/50us voltage surge (at open-circuit

- condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
  - 4) Different phase angles are done individually.
  - 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

## 12.7.Test Results

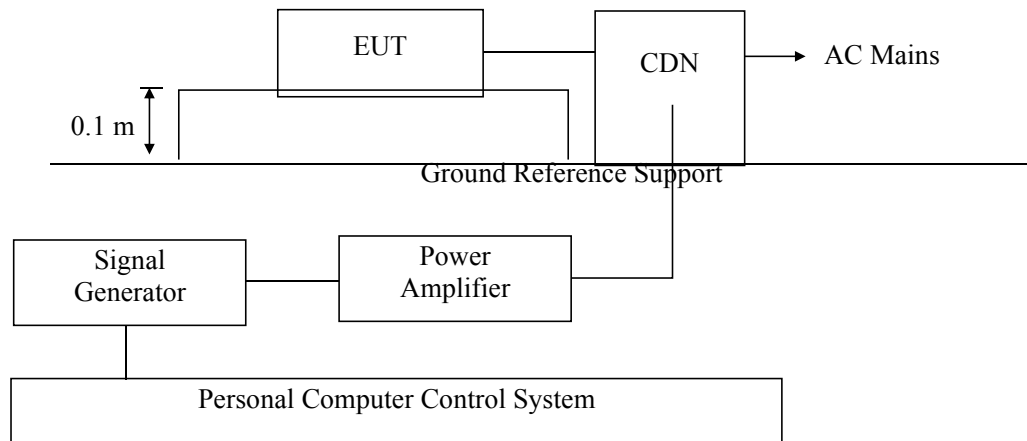
**PASS.**

### *Surge Immunity Test Results*

Test Mode: Oning							
Injected Line	Wave Form	Voltage (kV)	Phase	Number of Pulse	Performance criterion	Interval time	Result
L-N	1.2/50us	+1.0	0° ,90° , 180° ,270	20	1.0	60s	Pass
		-1.0	0° ,90° , 180° ,270	20	1.0	60s	Pass

## 13.INJECTED CURRENTS SUSCEPTIBILITY TEST

### 13.1.Block Diagram of Test AC Mains Setup



### 13.2.Test Standard

EN 55014-2:2015 (EN 61000-4-6:2007)  
Severity Level 2 at 3 V (rms), 0.15MHz ~ 80MHz

### 13.3.Severity Levels and Performance Criterion

#### 13.3.1.Severity level

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

#### 13.3.2.Performance criterion: A

### 13.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.2

### 13.5.Operating Condition of EUT

Setup the EUT as shown in Section 13.1.. The operating condition of EUT are listed in section 3.3

### 13.6.Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 13.1.

- 2) Let the EUT work in test mode and test it.
- 3) The EUT are placed on an insulating support 0.8m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 7) The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

### 13.7. Test Results

**PASS.**

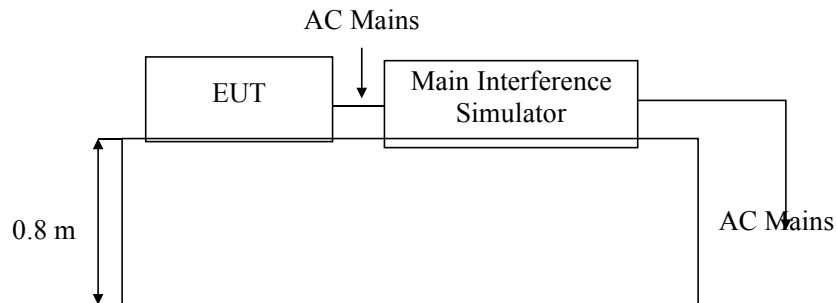
### *Injected Currents Susceptibility Test Results*

Test Mode: Oning				
Frequency Range	Injected Position	Strength	Criterion	Result
0.15MHz ~ 80MHz	AC Line	3V(rms), Unmodulated	A	PASS
Dwell time: 1s; Steps: 1%				



## 14. VOLTAGE DIPS AND INTERRUPTIONS TEST

### 14.1. Voltage Dips and Interruptions Test Setup



Remark: Combination wave generator and decoupling network are included in test generator.

### 14.2. Test Standard

EN 55014-2:2015 (EN 61000-4-11:2004)

### 14.3. Severity Levels and Performance Criterion

#### 14.3.1. Severity level

Test Level %U <sub>T</sub>	Voltage dip and short interruptions %U <sub>T</sub>	Duration (in period)
0	100	250p
40	60	5p
70	30	0.5p

#### 14.3.2. Performance criterion : C & B

### 14.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

### 14.5. Operating Condition of EUT

14.5.1. Setup the EUT as shown in Section 14.1.

14.5.2. Turn on the power of all equipments.

14.5.3. Let the EUT work in test mode (SPEAKERS Playing) and test it.

### 14.6. Test Procedure

1) Set up the EUT and test generator as shown on Section 14.1.

- 2) The interruptions is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

#### 14.7. Test Result

**PASS.**

### *Voltage Dips And Interruptions Test Results*

Test Mode: Oning					
Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in period)	Phase Angle	Criterion	Result
70	30	10P	90°	B	PASS
0	100	0.5P	180°	B	PASS
Remark: $U_T$ is the rated voltage for the equipment.					

## APPENDIX I

**Photo 1 General Appearance of the EUT**



----- END OF THE REPORT -----