

The logo consists of a large 'C' and 'E' symbol, followed by the text 'TEST REPORT' in a bold, sans-serif font.

For

**Product:** Plasma-positive and negative ions  
**Trade Name:** FUWEI  
**Model:** FUWEI/ARC-FLASH – 7K  
**Report No.:** TCT11207230002ER  
**Issued Date:** Jul.23, 2012

Issued for:

**FU WEI HIGH SCIENTIFIC CO . , LTD.**  
**No. 77, Lane 311, Nangong St., Yonukang City, Tainan**  
**County 710, Taiwan, R.O.C**

Issued By:

**Shenzhen TCT Testing Technology Co., Ltd.**  
**11-12F, Henglin Building, Baoyuan Road, Xixiang Street, Baoan District,**  
**Shenzhen, Guangdong, China**

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## 1 TEST CERTIFICATION

**Product:** Plasma-positive and negative ions

**Trade Name:** FUWEI

**Model:** FUWEI/ARC-FLASH – 7K

**Applicant:** FU WEI HIGH SCIENTIFIC CO . , LTD.  
No. 77, Lane 311, Nangong St., Yonukang City, Tainan County 710, Taiwan, R.O.C

**Manufacturer:** FU WEI HIGH SCIENTIFIC CO . , LTD.  
No. 77, Lane 311, Nangong St., Yonukang City, Tainan County 710, Taiwan, R.O.C

**Tested:** Jul.17 – Jul.23, 2012

**Applicable Standards:** EN 55014-1: 2006+A1:2009  
EN 61000-3-2:2006+A1:2009  
EN 61000-3-3:2008

EN 55014-2:1997+A1:2001+A2:2008  
EN 61000-4-2:2009  
EN 61000-4-3:2006+A1:2008+A2:2010  
EN 61000-4-4:2004+A1:2010  
EN 61000-4-5:2006  
EN 61000-4-6:2009  
EN 61000-4-11:2004

### Deviation from Applicable Standard

None

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

*Jack Li*

**Tested By:** \_\_\_\_\_

**Date:** Jul.23, 2012

*Anly. zhao*

**Check By:** \_\_\_\_\_

**Date:** Jul.23, 2012

*Tom*  
(Tom)

**Approved By:** \_\_\_\_\_

**Date:** Jul.23, 2012



## 2 TEST RESULT SUMMARY

EMISSION			
Standard	Item	Result	Remarks
EN 55014-1: 2006+A1:2009	Conducted (Main Port)	PASS	Meet limit
	Disturbance power	PASS	Meet limit
EN 61000-3-2:2006+A1:2009	Harmonic current emissions	PASS	Meet limit
EN 61000-3-3:2008	Voltage fluctuations & flicker	PASS	Meet limit

IMMUNITY [ EN 55014-2 : 1997+A1:2001+A2:2008 ]			
Standard	Item	Result	Remarks
EN 61000-4-2:2009	ESD	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-4:2004+A1:2010	EFT	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-5:2006	Surge	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-6:2009	CS	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-8: 2010	PFMF	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-11:2004	Voltage dips & voltage variations	PASS	Meets the requirements of Performance Criterion B

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

### 3 EUT DESCRIPTION

<b>Product</b>	Plasma-positive and negative ions
<b>Model</b>	FUWEI/ARC-FLASH – 7K
<b>Trade Mark</b>	<b>FUWEI</b>
<b>Applicant</b>	FU WEI HIGH SCIENTIFIC CO . , LTD.
<b>Housing material</b>	Plastic
<b>EUT Type</b>	<input checked="" type="checkbox"/> Engineering Sample. <input type="checkbox"/> Product Sample, <input type="checkbox"/> Mass Product Sample.
<b>Serial Number</b>	N/A
<b>EUT Power Rating</b>	N/A
<b>AC Line</b>	N/A

### I/O PORT

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

### Model list and Models difference

No.	Model Number	Tested With
1	FUWEI/ARC-FLASH – 7K	<input checked="" type="checkbox"/>
Other models	N/A	<input type="checkbox"/>

## 4 TEST METHODOLOGY

### 4.1. DECISION OF FINAL TEST MODE

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

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

Pre-Test Mode		
Emission	Conducted Emission	Mode: Running
	Disturbance power	Mode: Running

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

The Worst Test Mode		
Emission	Conducted Emission	Mode: Running
	Disturbance power	Mode: Running

### 4.2. EUT SYSTEM OPERATION

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

## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

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

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

**Note:**

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

## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

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

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 14. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. ACCREDITATIONS

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

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

### 6.3. MEASUREMENT UNCERTAINTY

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

<b>Measurement</b>	<b>Frequency</b>	<b>Uncertainty</b>
Conducted emissions	150kHz~30MHz	+/- 3.59dB
Disturbance power	30MHz~300MHz	+/- 4.77dB

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



## 7 EMISSION TEST

### 7.1. CONDUCTED EMISSION MEASUREMENT

#### 7.1.1. LIMITS

FREQUENCY (MHz)	At mains terminal		At load terminal and additional terminal	
	1	2	3	4
0.15 - 0.5	66 - 56	59 - 46	80	70
0.50 - 5.0	56	46	74	64
5.0 - 30.0	60	50	74	64

**NOTE:**

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

#### 7.1.2. TEST INSTRUMENTS

Conducted Emission Shielding Room Test Site (843)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100005	06/23/2012
LISN	AFJ	LS16	16010222119	06/28/2012
LISN(EUT)	Mestec	AN3016	04/10040	06/21/2012

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

### 7.1.3. TEST PROCEDURES

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

The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN55014-1 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

All I/O cables were positioned to simulate typical actual usage as per EN55014-1.

All support equipment power received from a second LISN.

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

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

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

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

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

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

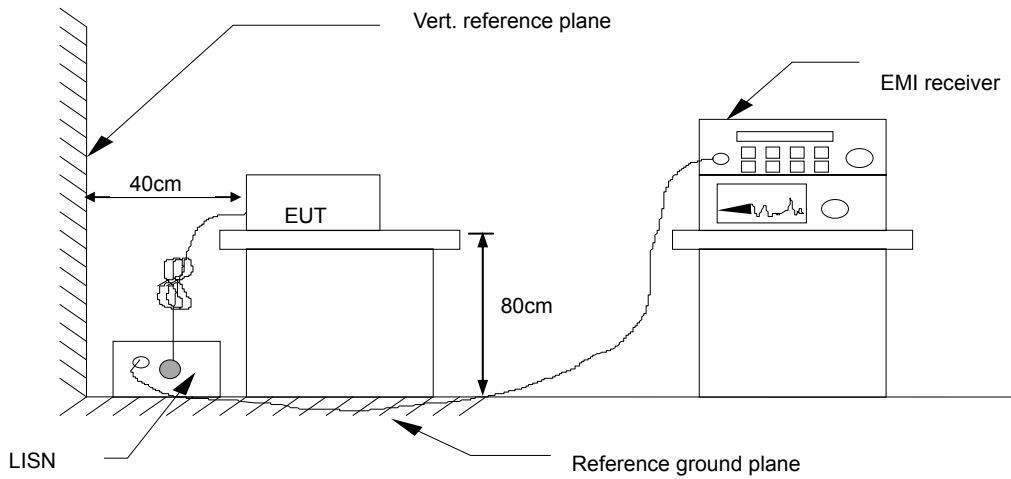
#### **Procedure of Final Test**

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

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

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

## 7.1.4. TEST SETUP



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

## 7.1.5. TEST RESULTS

<b>Model No.</b>	FUWEI/ARC-FLASH – 7K	<b>6dB Bandwidth</b>	10 KHz
<b>Environmental Conditions</b>	26°C,60% RH	<b>Test Mode</b>	ON
<b>Detector Function</b>	Peak / Quasi-peak/AV	<b>Test Result</b>	Pass
<b>Test By</b>	Jack Li		

### NOTE:

L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

“---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.

Freq. = Emission frequency in MHz

Reading level(dBuV) = Receiver reading

Corr. Factor (dB) = attenuator + Cable loss

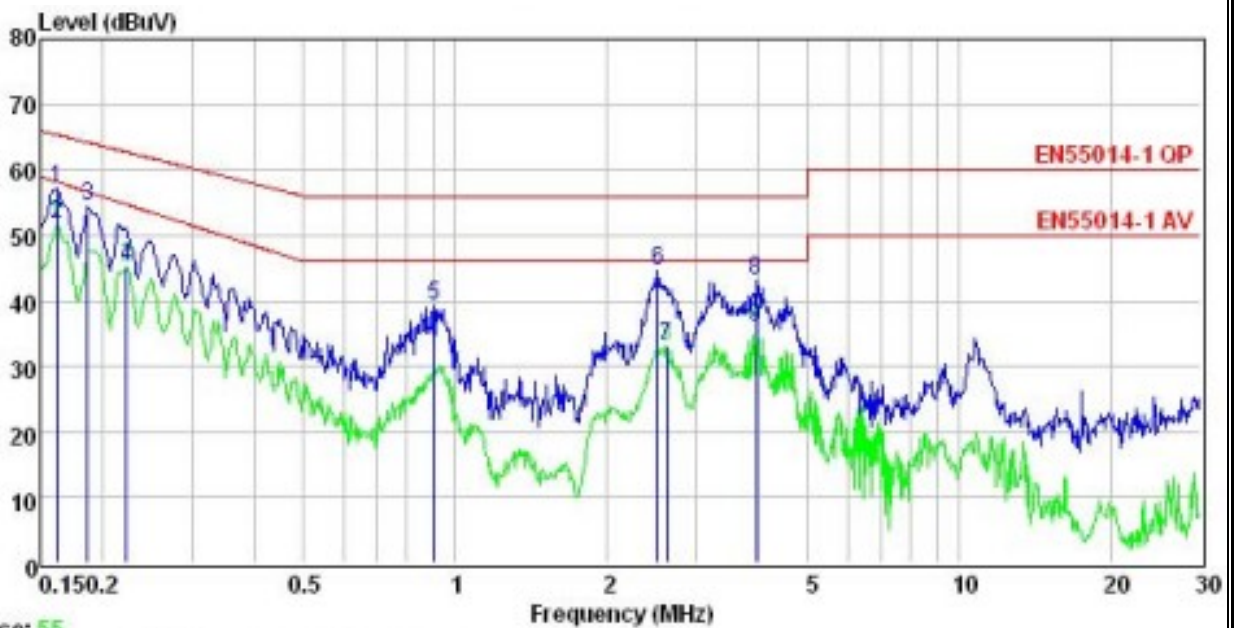
Level (dBuV) = Reading level(dBuV) + Corr. Factor (dB)

Limit (dBuV) = Limit stated in standard

Margin (dB) = Level (dBuV) – Limits (dBuV)

Q.P.=Quasi-Peak

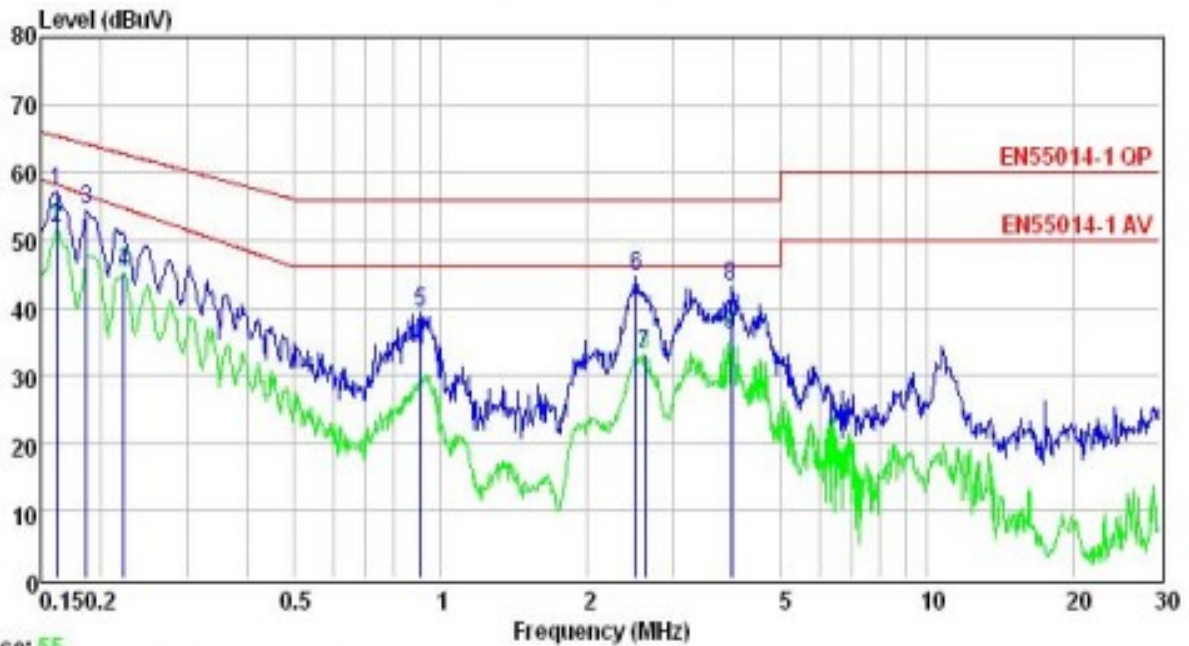
Please refer to following diagram for individual



Trace: 55

Site : CCIS Conducted Test Site  
 Condition : EN55014-1 QP LISN LINE  
 EUT : Adapter  
 Model :  
 Test Mode : On mode  
 Power Rating : AC 230V/50Hz  
 Environment : Temp: 23 °C Humi:50% Atmos:101KPa  
 Test Engineer: CGH  
 Remark : 2#

	Read	LISN	Cable	Limit	Over		
Freq	Level	Factor	Loss	Line	Limit	Remark	
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	46.16	10.24	0.78	57.18	65.34	-8.16 Peak
2	0.162	40.60	10.24	0.78	51.62	58.14	-6.52 Average
3	0.186	43.56	10.22	0.76	54.54	64.20	-9.66 Peak
4	0.222	34.36	10.22	0.76	45.34	54.77	-9.43 Average
5	0.904	28.15	10.20	0.85	39.20	56.00	-16.80 Peak
6	2.513	33.45	10.28	0.94	44.67	56.00	-11.33 Peak
7	2.622	21.85	10.28	0.94	33.07	46.00	-12.93 Average
8	3.943	31.96	10.29	0.89	43.14	56.00	-12.86 Peak
9	3.943	24.88	10.29	0.89	36.06	46.00	-9.94 Average



Trace: 55

Site : OCIS Conducted Test Site  
 Condition : EN55014-1 QP LISN LINE  
 EUT : Adapter  
 Model :  
 Test Mode : On mode  
 Power Rating : AC 230V/50Hz  
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa  
 Test Engineer: CGH  
 Remark : 2#

	Read Freq	Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.162	46.16	10.24	0.78	57.18	65.34	-8.16	Peak
2	0.162	40.60	10.24	0.78	51.62	58.14	-6.52	Average
3	0.186	43.56	10.22	0.76	54.54	64.20	-9.66	Peak
4	0.222	34.36	10.22	0.76	45.34	54.77	-9.43	Average
5	0.904	28.15	10.20	0.85	39.20	56.00	-16.80	Peak
6	2.513	33.45	10.28	0.94	44.67	56.00	-11.33	Peak
7	2.622	21.85	10.28	0.94	33.07	46.00	-12.93	Average
8	3.943	31.96	10.29	0.89	43.14	56.00	-12.86	Peak
9	3.943	24.88	10.29	0.89	36.06	46.00	-9.94	Average

## 7.2. DISTURBANCE POWER MEASUREMENT

### 7.2.1. LIMITS

FREQUENCY (MHz)	Quasi-Peak (dBpW)	Average (dBpW)
30 ~ 300	45 – 55	35 – 45

**NOTE:** (1) The lower limit shall apply at the transition frequency.

### 7.2.2. TEST INSTRUMENTS

Shielding Room(843)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100005	06/23/2012
ABSORBING CLAMP	FCC	F-201-23mm	160	06/06/2012
CABLE	TIME MICROWAVE	LMR-400	N-TYPE04	06/27/2012

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

### 7.2.3. TEST PROCEDURE

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

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 of (if main lead is shorter than 6 m it should be extended) as per CISPR 14/EN 55014-1.

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.

The EUT test program was started. Emissions were scanned and measured using a receiver connected to the absorbing clamp.

The absorbing clamp is positioned for maximum indication at each test frequency (30MHz to 300MHz), that means is clamp moved along the main lead until the maximum emission value is found.

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

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

The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

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

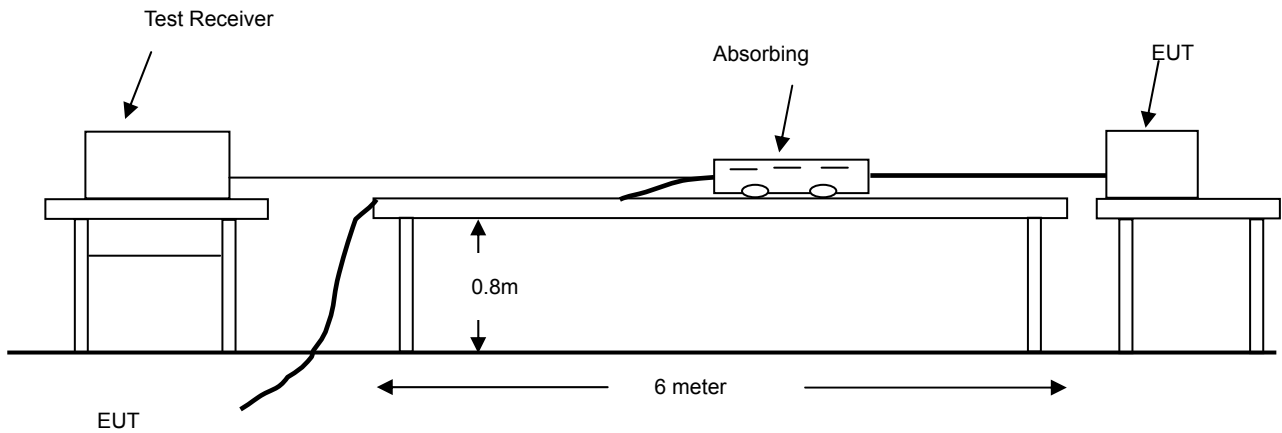
EUT and support equipment were set up on the wooden table as per step 6 of the preliminary test.

The receiver scanned from 30MHz to 300MHz. Emissions were scanned and measured to moving the absorbing clamp along the main lead until the maximum emission value is found.

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

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

## 7.2.4. TEST SETUP



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

## 7.2.5 TEST RESULTS

<b>Model No.</b>	FUWEI/ARC-FLASH – 7K	<b>Test Mode</b>	ON
<b>Environmental Conditions</b>	26°C, 60% RH	<b>6dB Bandwidth</b>	120 KHz
<b>Detector Function</b>	Peak / Quasi-Peak/AV	<b>Test Result</b>	Pass
<b>Test By</b>	Jack Li		

Freq. = Emission frequency in MHz

Reading level(dBpW) = Receiver reading

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

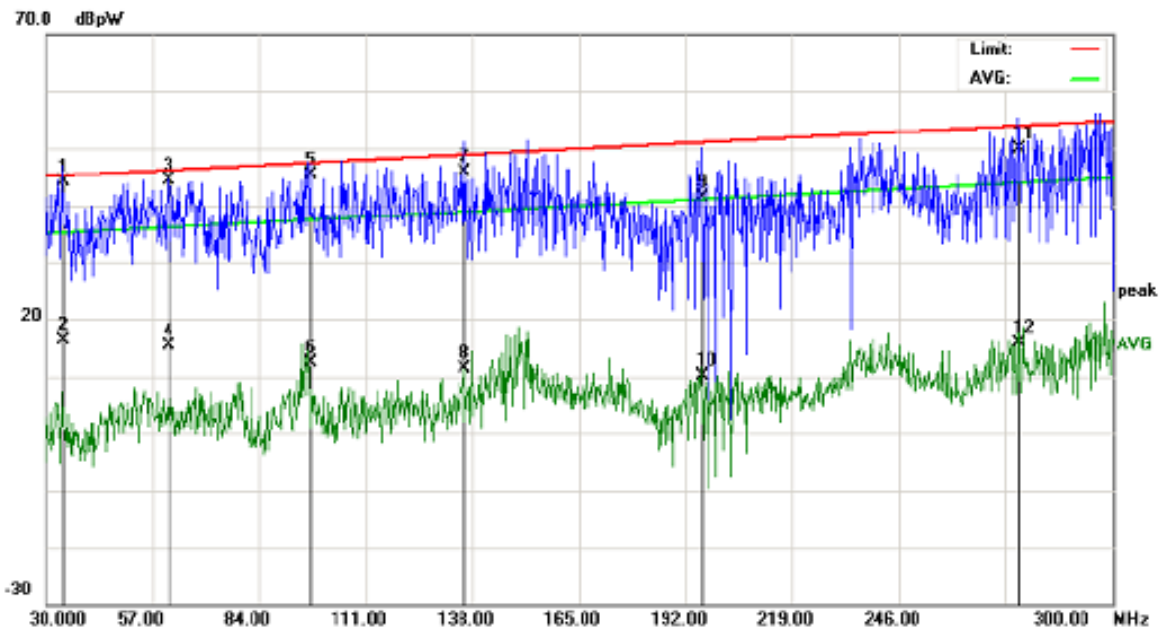
Measurement (dBpW) = Reading level(dBpW) + Corr. Factor (dB)

Limit (dBpW) = Limit stated in standard

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



Please refer to following diagram for individual  
Disturbance Power Measurement



Site site #1  
 Limit: EN55014 Clamp(QP)  
 Note: AC Line  
 Temperature: 26  
 Humidity: 60 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBpW	Limit dBpW	Over dB	Detector	Position cm	Comment
1	*	34.0800	22.01	22.02	44.03	45.15	-1.12	QP		
2		34.0800	-5.58	22.02	16.44	35.15	-18.71	AVG		
3		60.8400	22.33	22.17	44.50	46.14	-1.64	QP		
4		60.8400	-6.88	22.17	15.29	36.14	-20.85	AVG		
5		97.2000	24.98	20.42	45.40	47.49	-2.09	QP		
6		97.2000	-8.03	20.42	12.39	37.49	-25.10	AVG		
7		135.8400	26.73	19.22	45.95	48.92	-2.97	QP		
8		135.8400	-7.82	19.22	11.40	38.92	-27.52	AVG		
9		195.8800	22.56	18.73	41.29	51.14	-9.85	QP		
10		195.8800	-8.61	18.73	10.12	41.14	-31.02	AVG		
11		276.0000	27.19	22.64	49.83	54.11	-4.28	QP		
12		276.0000	-6.73	22.64	15.91	44.11	-28.20	AVG		

\*:Maximum data    x:Over limit    l:over margin

(Reference Only)

## 8 IMMUNITY TEST

### 8.1. GENERAL DESCRIPTION

Product Standard	EN 55014-2 : 1997+A1:2001+A2:2008	
	Test Type	Minimum Requirement
<b>Basic Standard, Specification, and Performance Criterion required</b>	EN 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, Power line: 1kV, Signal line: 0.5kV, Performance Criterion B
	EN 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, Power Port ~ Line to line: 1kV, Line to ground: 2kV Signal Port ~ Lines to ground : 1kV Performance Criterion B
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test –CS: 0.15 ~ 230 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	EN 61000-4-8	Power frequency magnetic field immunity test 50 Hz, 3A/m Performance Criterion A
	EN 61000-4-11	Voltage Dips: i) 30% reduction for 50 period, Performance Criterion C ii) 60% reduction for 10 period, Performance Criterion C Voltage Interruptions: 100% reduction for 0.5 period Performance Criterion C

## 8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

<b>Criteria A:</b>	The apparatus shell continues 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 apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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.
<b>Criteria B:</b>	<p>After test, the apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is however allowed. However, no change of operating state if stored data is allowed to persist after the test. If the manufacturer does not specify the minimum performance level or the permissible performance loss, 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>
<b>Criteria C:</b>	<p>Temporary loss of function is allowed, provided the functions is self-recoverable or can be restored by the operation of controls by the user in accordance with the manufacturer instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

### 8.3. ELECTROSTATIC DISCHARGE (ESD)

#### 8.3.1. TEST SPECIFICATION

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

#### 8.3.2. TEST INSTRUMENT

IMMUNITY SHIELDED ROOM				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESD 2000	EMC PARTNER	ESD2000	182	06/21/2012

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

### 8.3.3. TEST PROCEDURE

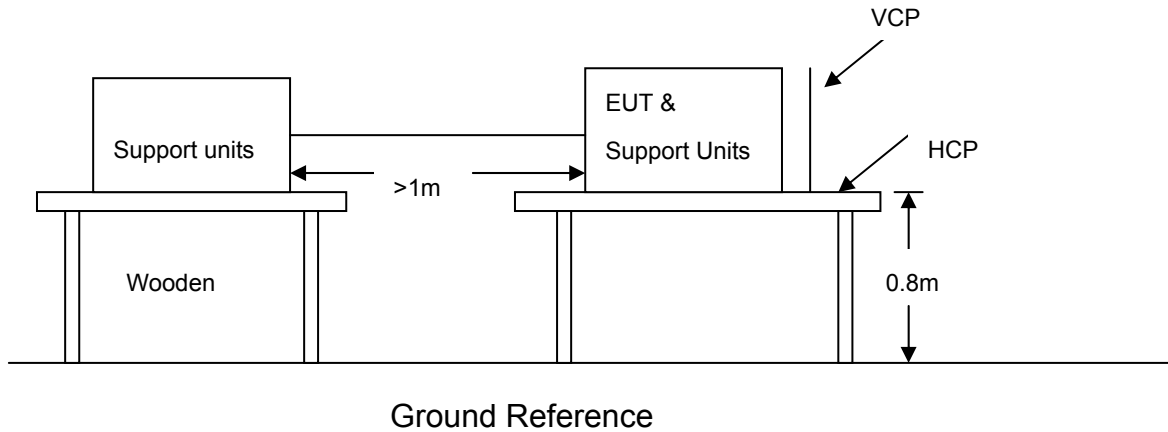
The discharges shall be applied in two ways:

- a) Contact discharges to the conductive surfaces and coupling planes:  
Twenty dischargers (10 with positive and 10 with negative polarity) shall be applied on each accessible metallic part of the enclosure, terminals are excluded. In case of a non-conductive enclosure, dischargers shall be applied on the horizontal or vertical coupling planes. Test shall be performed at a maximum repetition rate of one discharge per second.
- b) Air discharges at slots and apertures and insulating surfaces:  
On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

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

- a) The EUT was located 0.1 m minimum from all side of the **HCP** (dimensions 1.6m x 0.8m).
- b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
- c) The time interval between two successive single discharges was at least 1 second.
- d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each **HCP** opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the **HCP** and perpendicular to its front edge during the discharge.
- g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane (VCP)** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

### 8.3.4. TEST SETUP



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

#### NOTE:

##### TABLE-TOP EQUIPMENT

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

##### FLOOR-STANDING EQUIPMENT

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

### 8.3.5. TEST RESULTS

Temperature:	25°C	Humidity	55% RH
Pressure	996mbar	Test result	Pass
Test mode	ON	Test By	Jack Li

Air Discharge						
Test locations		Test Levels	Results			
		± 8 kV	Pass	Fail	Performance Criterion	Observation
Slot	6Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2
Switch	1Points	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2

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

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

## 8.4. ELECTRICAL FAST TRANSIENT (EFT)

### 8.4.1. TEST SPECIFICATION

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

### 8.4.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	06/11/2012

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

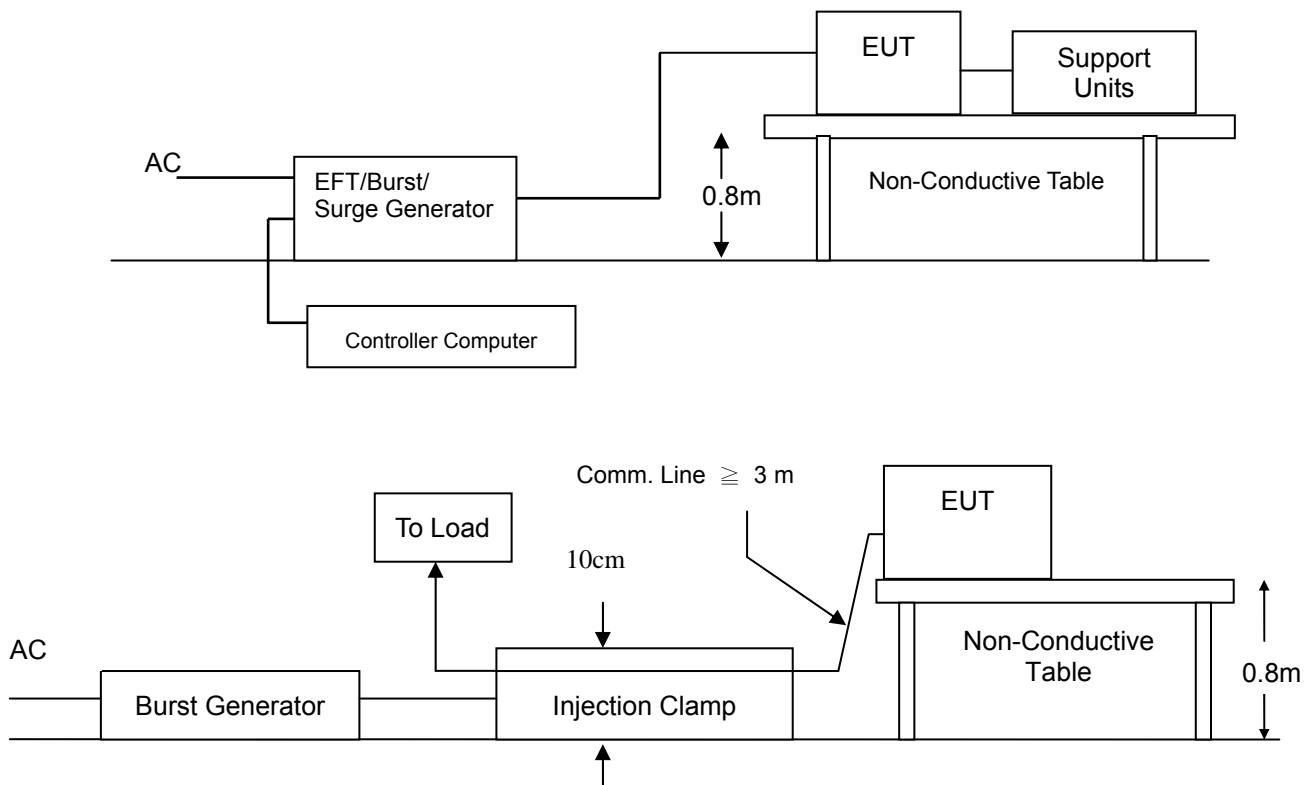
2. N.C.R.= No Calibration required

### 8.4.3. TEST PROCEDURE

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



#### 8.4.4. TEST SETUP



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

#### NOTE:

##### TABLETOP EQUIPMENT

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

##### FLOOR STANDING EQUIPMENT

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

## 8.4.5. TEST RESULTS

Temperature:	25 °C	Humidity	55% RH
Pressure	996mbar	Test result	Pass
Test mode:	ON	Test By	Jack Li

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

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

## 8.5. SURGE IMMUNITY TEST

### 8.5.1 TEST SPECIFICATION

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

### 8.5.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	06/11/2012

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

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

### 8.5.3. TEST PROCEDURE

a) For EUT power supply:

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

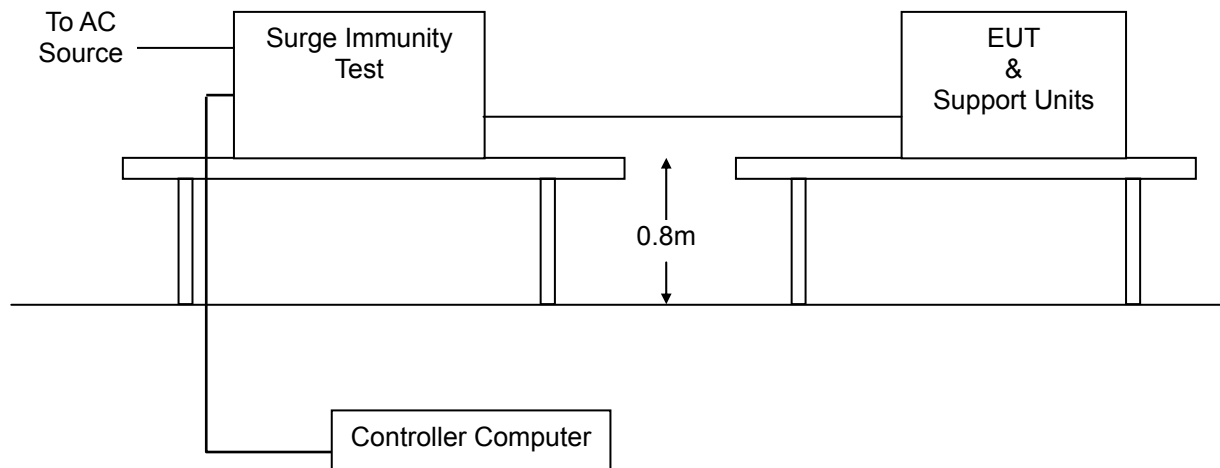
b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:

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

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

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

### 8.5.4. TEST SETUP



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

## 8.5.5. TEST RESULTS

Temperature:	25°C	Humidity	55% RH
Pressure	996mbar	Test Result	Pass
Test mode	ON	Test By	Jack Li

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L 1 - L 2	+/-	1	B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	PASS
L1 - PE	--	--	--	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
L2 - PE	--	--	--	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
R - Ground	--	--	--	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A
T - Ground	--	--	--	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2	N/A

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

## 8.6. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

### 8.6.1. TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-6
<b>Frequency Range:</b>	0.15 MHz ~230 MHz
<b>Field Strength:</b>	3 V
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Coupled cable:</b>	Power Mains, Shielded
<b>Coupling device:</b>	CDN-M3/2 (2 wires)
<b>Performance Criterion:</b>	A

### 8.6.2. TEST INSTRUMENT

CS Test				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Signal Generator	Maconi	2022D	119246/003	06/20/2012
Power Amplifier	M2S	A00181-1000	9801-112	06/29/2012
CDN	MEB	M3-8016	003683	06/19/2012

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

### 8.6.3. TEST PROCEDURE

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

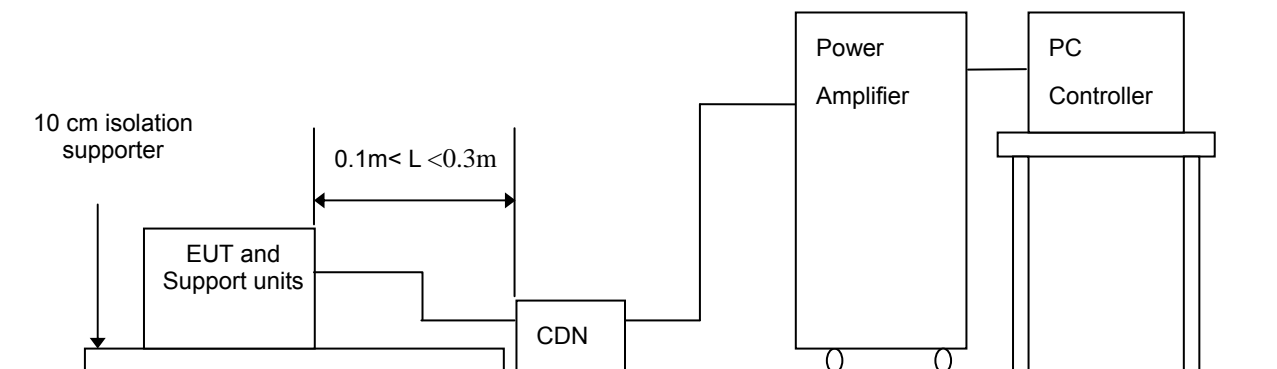
The test shell performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 230 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was  $1.5 \times 10^{-3}$  decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 230 MHz.

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

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

### 8.6.4. TEST SETUP



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

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

**NOTE:**

TABLE-TOP AND FLOOR-STANDING EQUIPMENT

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

**8.6.5. TEST RESULTS**

<b>Temperature:</b>	25°C	<b>Humidity</b>	55% RH
<b>Pressure</b>	996mbar	<b>Test Result</b>	Pass
<b>Test mode</b>	ON	<b>Test By</b>	Jack Li

Frequency Band (MHz)	Field Strength (Vrms)	Injected Position	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 230	3	AC Mains	CDN-M2	A	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

- NOTE:** 1. There was no change compared with initial operation during the test.  
2. The loss of function of the EUT during the test and it was recovered by itself operation after the test.  
3. This item is tested by Shenzhen Academy of Metrology & Quality Inspection



## 8.7. VOLTAGE DIP & VOLTAGE INTERRUPTIONS

### 8.7.1. TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-11
<b>Test Duration Time:</b>	Minimum three test events in sequence
<b>Interval Between Event:</b>	Minimum 10 seconds
<b>Phase Angle:</b>	0 / 45 / 90 / 135 / 180 / 225 / 270 / 315 / 360
<b>Test Cycle:</b>	3 times
<b>Performance Criterion:</b>	B,C

### 8.7.2. TEST INSTRUMENT

Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC PARTNER TRANSIENT 2000	EMC PARTNER	TRA2000	881	06/11/2012

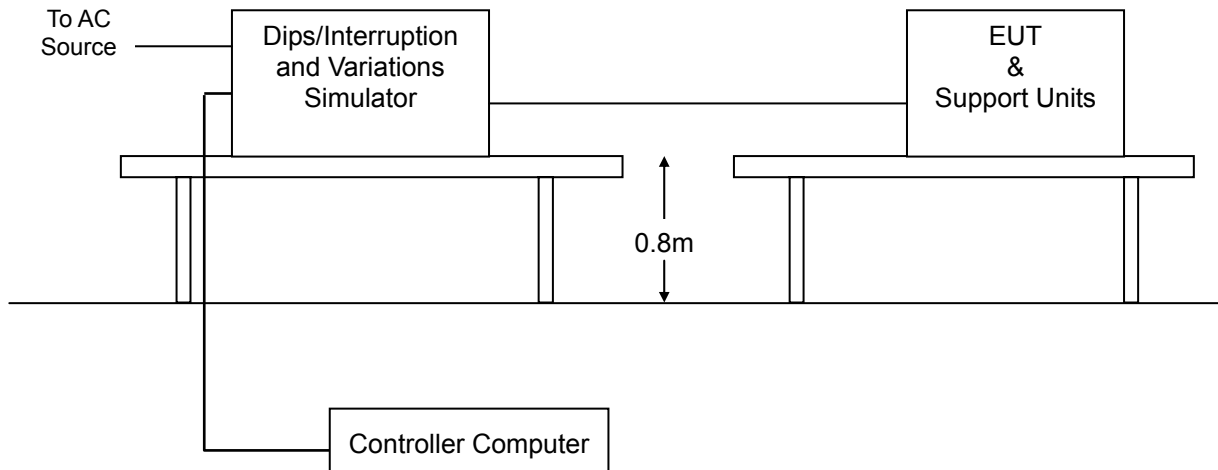
**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).  
2. N.C.R.= No Calibration required

### 8.7.3. TEST PROCEDURE

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

## 8.7.4. TEST SETUP

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



## 8.7.5. TEST RESULTS

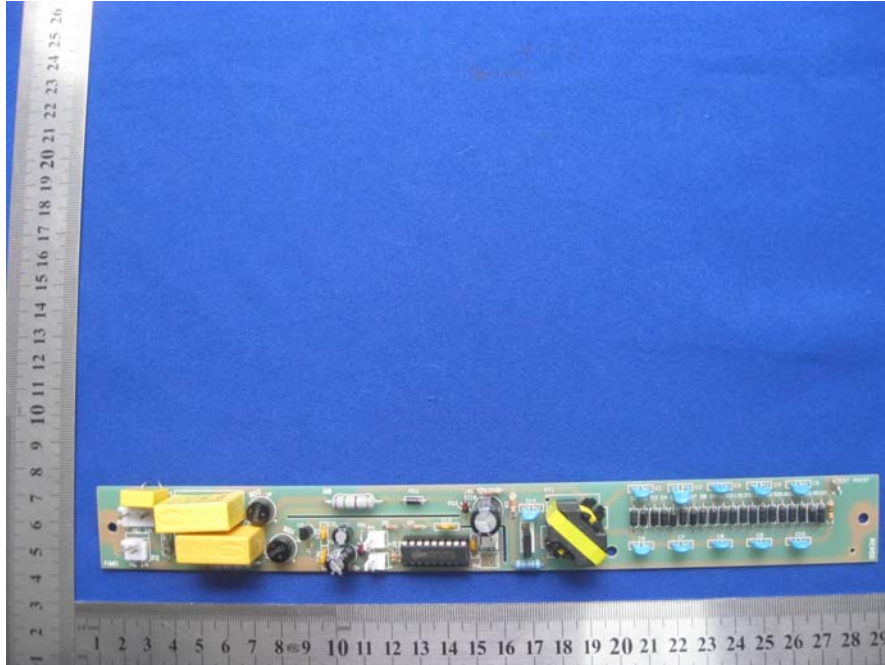
<b>Temperature:</b>	25°C	<b>Humidity</b>	55% RH
<b>Pressure</b>	996mbar	<b>Test Result</b>	Pass
<b>Test mode</b>	ON	<b>Test By</b>	Jack Li

Test Power: 230Vac, 50Hz				
Voltage (% Reduction)	Duration (Period)	Performance Criterion	Observation	Test Result
40	10	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	PASS
70	50	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	PASS
0	0.5	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3	PASS

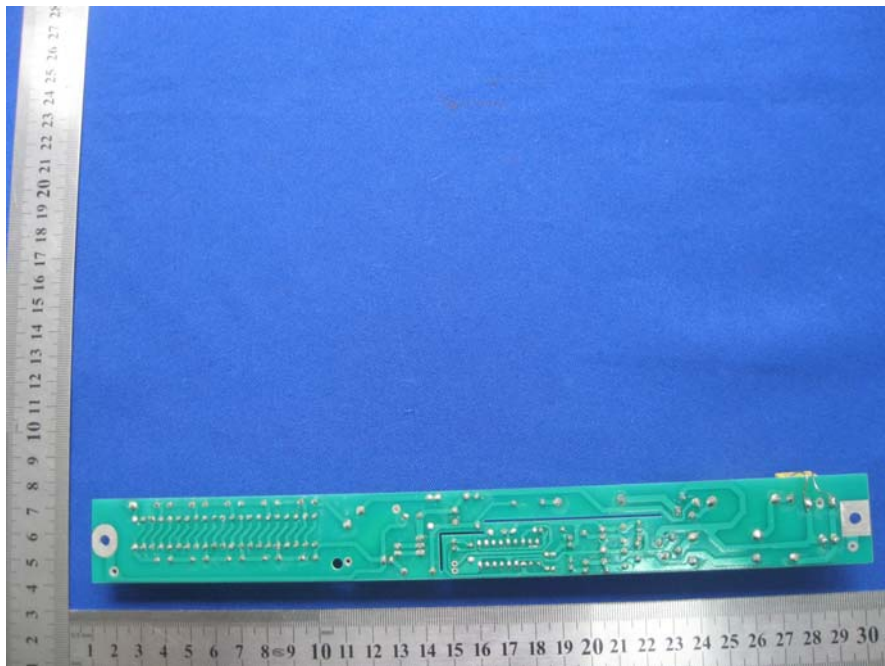
- NOTE:** 1. There was no change compared with initial operation during and after the test.  
 No unintentional response was found during the test.  
 2. The function stopped during the test, but can be recoverable by itself operation after the test.  
 3. The function stopped during the test, but can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

## 9 PHOTOGRAPHS OF EUT

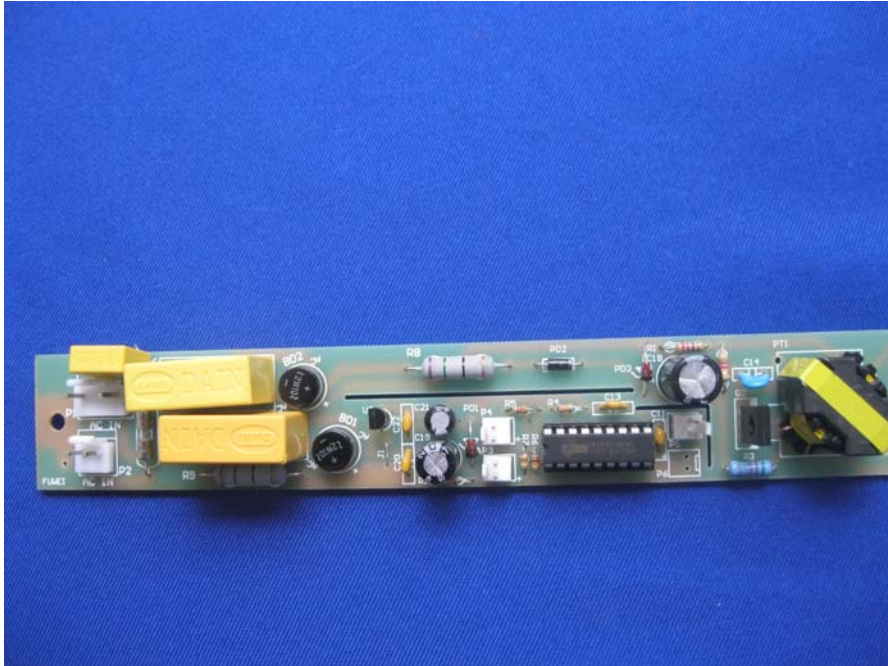
Appearance photograph of EUT



Appearance photograph of EUT



Appearance photograph of EUT



Appearance photograph of EUT

