

# EMC UPDATE TEST REPORT

For

IPC

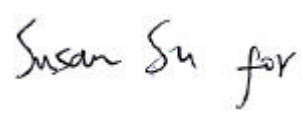
**Applicant** : Advantech Co., Ltd.  
**Trade Name** : Advantech  
**Model Number** : SG-1003; \*\* SG-1103  
**Date** : February 6, 2003  
**Date of Test** : January 28 ~ 30, 2003  
**Revision** : 00  
**Reference Standard** :

| Standards                                   | Results (Pass/Fail) |
|---|---------------------|
| EN 55022: 1994 + A1: 1995 + A2: 1997        | PASS                |
| EN 55011:1998 + A1: 1999 (Group 1, Class A) | PASS                |
| EN 61000-3-2: 1995 + A1: 1998 + A2: 1998    | PASS                |
| EN 61000-3-3: 1995                          | PASS                |
| EN 55024: 1998                              | PASS                |
| - IEC 61000-4-2: 2001                       | PASS                |
| - IEC 61000-4-3: 1995                       | PASS                |
| - IEC 61000-4-4: 1995                       | PASS                |
| - IEC 61000-4-5: 1995                       | PASS                |
| - IEC 61000-4-6: 1996                       | PASS                |
| - IEC 61000-4-8: 1993                       | PASS                |
| - IEC 61000-4-11: 1994                      | PASS                |

## Description of Rev.00:

1. Applicant adds one model number and one new appearance for marketing purpose.  
(Please refer to have \*\* mark items on this report)
2. Applicant adds one VGA Port, PS/2 Keyboard/ Mouse Port, and revised EN 55022: 1998 to EN 55022: 1997 to re-test.  
(Please refer have \*\* mark items on this report)
3. Other information please refers to the Rev.00 (021196) and this (Rev. 00) test report.

Approved by Authorized Signatory: \_\_\_\_\_

  
Jonson Lee / EMC Director

## VERIFICATION OF COMPLIANCE

**Equipment Under Test:** IPC  
**Trade Name:** Advantech  
**Model Number:** SG-1003; \*\*SG-1103  
**Serial Number:** N/A  
**Applicant:** Advantech Co., Ltd.  
No. 1, Alley 20, Lane 26, Rueiguang Road,  
Neihu District, Taipei 114, R.O.C.

**Manufacturer:** Advantech Co., Ltd.  
No. 1, Alley 20, Lane 26, Rueiguang Road,  
Neihu District, Taipei 114, R.O.C.

**Type of Test:** EMC Directive 89/336/EEC for CE Marking  
**Technical Standards:** EN 55022: 1994 + A1: 1995 + A2: 1997  
EN55011: 1998 + A1: 1999 (Group1, Class A)  
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998  
EN 61000-3-3: 1995  
EN55024: 1998  
(IEC 61000-4-2: 2001; IEC 61000-4-3: 1995; IEC 61000-4-4: 1995;  
IEC 61000-4-5: 1995; IEC 61000-4-6: 1996; IEC 61000-4-8: 1993;  
IEC 61000-4-11:1994)

**File Number:** 030068-E  
**Date of Test:** January 28 ~ 30, 2003  
**Deviation:** According to applicant's declaration this EUT is a class A product, and to be market in industrial environment only.  
**Condition of Test Sample:** Normal  
**Final Result:** Pass  
**Worst Data:** See below

| Test Item  | Freq. (MHz) | Measured Data | Margin (M <sub>i</sub> C) | Remark |
|--|-------------|---------------|---------------------------|--------|
| Radiated Emission  | 796.17      | 43.5 (dB/m)   | -3.5dB (± 3.3308 dB)      |        |
| Conducted Emission   | 1.063       | 52.3 (dB)     | -20.7dB (± 2.8216 dB)     |        |
| ● The negative sign in Margin cell means under the specific limit.   |             |               |                           |        |
| ● This test result traceable to national or international standards. |             |               |                           |        |

The above equipment was tested by C&C Laboratory Co., Ltd. for compliance with the requirements set forth in EMC Directive 89/336/EEC and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

## PRODUCT INFORMATION

|                                    |  |                 |                 |
|------------------------------------|--|-----------------|-----------------|
| <b>Housing Type:</b>               | Metal case   |                 |                 |
| <b>EUT Power Rating:</b>           | DCV from Power Adapter                             |                 |                 |
| <b>AC power during Test:</b>       | 230VAC/50Hz to Power Adapter                       |                 |                 |
| <b>Power Adapter Manufacturer:</b> | POWER-WIN  | <b>Model:</b>   | PW-012A2-1Y05C0 |
| <b>Power Adapter Power Rating:</b> | I/ P: 100-240VAC, 50/ 60Hz, 1A<br>O/ P: 5VDC, 2.4A |                 |                 |
| <b>DC Power Cable Type:</b>        | Unshielded, 2.0m (Non-detachable) at Power Adapter |                 |                 |
| <b>CPU Manufacture:</b>            | SIS 550  | <b>Type:</b>    | 220MHz          |
| <b>OSC/Clock Frequencies:</b>      | 100MHz   |                 |                 |
| <b>Memory Capacity:</b>            |  | <b>Install:</b> | 128MB           |
| <b>HDD Manufacturer:</b>           | DATAFAB  | <b>Model:</b>   | COMPACTFLASH    |
| <b>Mother Board Manufacturer:</b>  | Advantech  | <b>Model:</b>   | FW-100          |
| <b>Classis Manufacturer:</b>       | Advantech  | <b>Model:</b>   | SG-1003         |

### I/O PORT OF EUT:

| I/O PORT TYPES                 | Q' TY | TESTED WITH |
|--------------------------------|-------|-------------|
| 1. Serial Port                 | 1     | 1           |
| 2. LAN Port                    | 3     | 3           |
| 3. **PS/2 Keyboard/ Mouse Port | 1     | 1           |
| 4. **Video Out Port (VGA)      | 1     | 1           |

**Note:** There is one LAN port of EUT was used to do actual communication during the test, the other ports were connected open loop unshielded cables to intend getting maximum emission from the EUT.

## SUPPORT EQUIPMENT

| No. | Equipment            | Model #  | Serial #       | FCC ID       | Trade Name | Data Cable                 | Power Cord   |
|-----|----------------------|----------|----------------|--------------|------------|----------------------------|--|
| 1.  | Monitor              | CPD-G200 | 2715863        | FCC DoC      | SONY       | Shielded, 1.8m with a core | Unshielded, 1.8m   |
| 2.  | Modem                | 231AA    | A25531083541   | BFJ9D93108US | Hayes      | Shielded, 1.8m             | Unshielded, 1.8m   |
| 3.  | PS/ 2 Keyboard       | SK-2800C | B1C790BCPJ73JM | GYUR79SK     | Compaq     | Shielded, 1.8m             | N/A  |
| 4.  | PS/ 2 Mouse          | M-CAA43  | LZE02801285    | FCC DoC      | Logitech   | Shielded, 1.8m             | N/A  |
| 5.  | Notebook PC (Remote) | M285     | NU2503589      | FCC DoC      | LEO        | LAN Cable: Unshielded, 10m | AC I/P: Unshielded, 1.8m<br>DC O/P: Unshielded, 1.8m with a core |

**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

## BLOCK DIAGRAM OF TEST SETUP

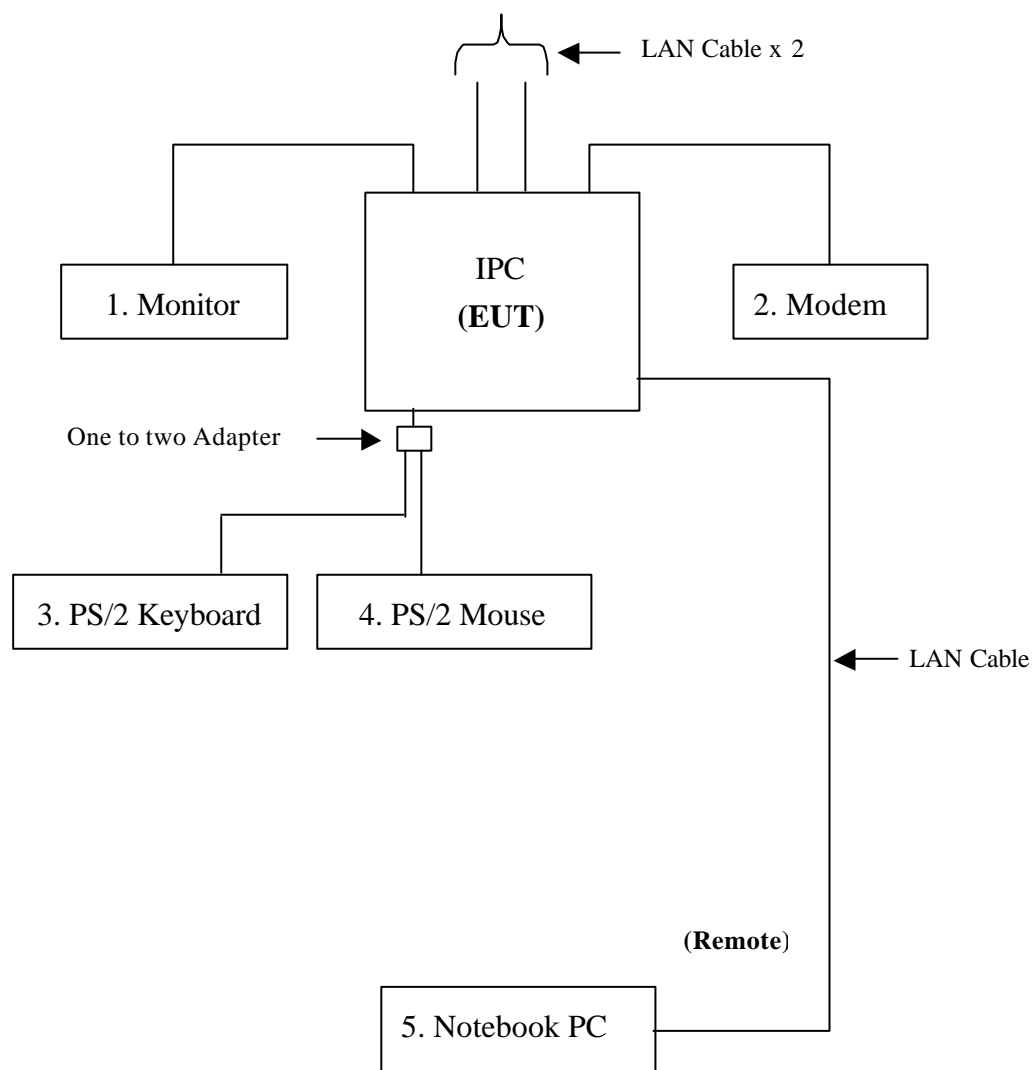
### System Diagram of Connections between EUT and Simulators

**EUT:** IPC

**Trade Name:** Advantech

**Model Number:** SG-1103

**AC Power Cord:** Unshielded, 1.8m to Power Adaptor



## TEST EQUIPMENT LIST (EMISSION)

**Instrumentation:** The following list contains equipment used at C & C Laboratory, Co., Ltd. for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2-1988 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 9kHz to 1.0 / 2.0 GHz.

**Equipment used during the tests:**

**Open Area Test Site:** # 1

| Open Area Test Site # 1 |         |              |               |            |            |
|-------------------------|---------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE          | MFR     | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL. DUE   |
| Q.P Adaptor             | HP      | 85650A       | 2043A00373    | 06/12/2002 | 06/11/2003 |
| RF Pre-selector         | HP      | 85685A       | 3010A01113    | 06/12/2002 | 06/11/2003 |
| Spectrum Analyzer       | HP      | 8568B        | 2415A00314    | 06/12/2002 | 06/11/2003 |
| S.P.A Display           | HP      | 85662A       | 2403A06937    | 06/12/2002 | 06/11/2003 |
| Spectrum Analyzer       | Anritsu | MS2601A      | MT09950       | N/A        | N/A        |
| Pre-Amplifier           | HP      | 8447D        | 2944A08432    | N/A        | N/A        |
| Bilog Antenna           | CHASE   | CBL6112A     | 2309          | 02/09/2002 | 02/08/2003 |
| Turn Table              | EMCO    | 2081-1.21    | N/A           | N.C.R      | N.C.R      |
| Antenna Tower           | EMCO    | 2075-2       | 9707-2604     | N.C.R      | N.C.R      |
| Controller              | EMCO    | 2090         | N/A           | N.C.R      | N.C.R      |
| RF Switch               | ANRITSU | MP59B        | M54367        | N.C.R      | N.C.R      |

**Conducted Emission Test Site:** # 4

| Conducted Emission Test Site # 4 |      |              |               |            |            |
|----------------------------------|------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE                   | MFR  | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL. DUE   |
| EMI Test Receiver                | R&S  | ESCS30       | 847793/012    | 12/21/2002 | 12/20/2003 |
| LISN                             | R&S  | ENV 4200     | 830326/016    | 02/08/2002 | 02/07/2003 |
| LISN                             | EMCO | 3825/2       | 9003/1382     | 02/18/2002 | 02/17/2003 |

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

| Power Harmonic & Voltage Fluctuation/Flicker Measurement (61000-3-2&-3-3)        |                |              |               |            |            |
|--|----------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Harmonic & Flicker Tester  | HAEFELY TRENCH | PHF555       | 080 419-25    | 10/14/2002 | 10/13/2003 |
| ESD test (61000-4-2)   |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| ESD Generator  | NoiseKen       | ESS-2001     | ESS0210582    | 06/18/2002 | 06/17/2003 |
| Radiated Electromagnetic Field immunity Measurement (61000-4-3)                  |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| S.G.   | R&S            | SMY02        | 100094        | 08/08/2002 | 08/07/2003 |
| Power Amplifier  | ar             | 150W1000     | 300300        | N/A        | N/A        |
| Power Antenna  | EMCO           | 93141        | 9712-1083     | N/A        | N/A        |
| EM PROBE   | GW             | EMR-30       | L-0013        | 05/23/2002 | 05/22/2003 |
| Fast Transients/Burst test (61000-4-4)   |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Fast Transients/Burst Generator  | HAEFELY TRENCH | PEFT-JUNIOR  | 583 333-117   | 08/22/2002 | 08/21/2003 |
| Clamp  | HAEFELY TRENCH | 093 506.1    | 080 421.13    | N/A        | N/A        |
| Surge Immunity test (61000-4-5)  |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Surge Tester   | HAEFELY TRENCH | PSUGER 4010  | 583 334-71    | 09/03/2002 | 09/02/2003 |
| CS test (61000-4-6)  |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| S.G.   | R&S            | SMY02        | 100094        | 08/08/2002 | 08/07/2003 |
| Power Amplifier  | ar             | 500A100A     | 300299        | N/A        | N/A        |
| CDN  | Lüthi          | 801-M3       | 1879          | 03/05/2002 | 03/04/2003 |
| CDN  | MEB            | M2           | A3002010      | 04/24/2002 | 04/23/2003 |
| CDN  | SCHAFFNER      | T400         | 16906         | 10/17/2002 | 10/16/2003 |
| Power Frequency Magnetic Field Immunity test (61000-4-8)                         |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| TRIAX ELF Magnetic Field Meter   | F.W.BELL       | 4090         | 9711          | 10/21/2002 | 10/20/2003 |
| Magnetic Field Tester  | HAEFELY TRENCH | MAG 100.1    | 080 938-01    | N/A        | N/A        |
| Voltage Dips/Short Interruption and Voltage Variation Immunity test (61000-4-11) |                |              |               |            |            |
| EQUIPMENT TYPE   | MFR            | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Dips/Interruption and Variations Simulator                                       | HAEFELY TRENCH | PLINE 1610   | 080 344-05    | 04/08/2002 | 04/07/2003 |

## **EUT Configuration during measurement:**

- 1) Pre-scan mode(s) are list as below:

**Mode(s):**

- 1. Data transmit (10Mbps)**
- 2. Data transmit (100Mbps)**

- 2) After pre-scan, found mode 2 producing the highest emission level, used this mode for all final test.



## SUMMARY DATA

### (LINE CONDUCTED TEST)

**Model Number:** SG-1103

**Location:** Site # 4

**Tested by:** Lung Tsai

**Test Mode:** Mode 2

**Test Results:** Passed

**Temperature:** 19°C

**Humidity:** 65% RH

(The chart below shows the highest readings taken from the final data)

| FREQ<br>MHz | Q.P.<br>RAW<br>dBuV | AVG<br>RAW<br>dBuV | Q.P.<br>Limit<br>dBuV | AVG<br>Limit<br>dBuV | Q.P.<br>Margin<br>dB | AVG<br>Margin<br>dB | NOTE |
|-------------|---------------------|--------------------|-----------------------|----------------------|----------------------|---------------------|------|
| 0.230       | 54.70               | ---                | 79.00                 | 66.00                | -24.30               | ---                 | L1   |
| 1.774       | 49.70               | ---                | 73.00                 | 60.00                | -23.30               | ---                 | L1   |
| 2.983       | 43.10               | ---                | 73.00                 | 60.00                | -29.90               | ---                 | L1   |
| 4.433       | 37.10               | ---                | 73.00                 | 60.00                | -35.90               | ---                 | L1   |
| 17.563      | 39.30               | ---                | 73.00                 | 60.00                | -33.70               | ---                 | L1   |
| 17.781      | 37.80               | ---                | 73.00                 | 60.00                | -35.20               | ---                 | L1   |
| 0.233       | 49.70               | ---                | 79.00                 | 66.00                | -29.30               | ---                 | L2   |
| 1.063       | 52.30               | ---                | 73.00                 | 60.00                | -20.70               | ---                 | L2   |
| 2.371       | 51.40               | ---                | 73.00                 | 60.00                | -21.60               | ---                 | L2   |
| 12.567      | 41.70               | ---                | 73.00                 | 60.00                | -31.30               | ---                 | L2   |
| 17.153      | 39.70               | ---                | 73.00                 | 60.00                | -33.30               | ---                 | L2   |
| 17.884      | 38.30               | ---                | 73.00                 | 60.00                | -34.70               | ---                 | L2   |

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

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

## SUMMARY DATA

### (RADIATED EMISSION TEST)

**Model Number:** SG-1103

**Location:** Site # 1

**Tested by:** Sam Chang

**Polar:** Vertical--10m

**Test Mode:** Mode 2

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 25°C

**Humidity:** 50%RH

(The chart below shows the highest readings taken from the final data)

| Freq.<br>(MHz) | Raw<br>Data<br>( dBuV/m ) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(dB) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|
| 51.96          | 24.0                      | 10.7                    | 34.7                          | 40.0   | -5.3           |
| 299.93         | 18.0                      | 15.6                    | 33.6                          | 47.0   | -13.4          |
| 499.98         | 14.9                      | 21.1                    | 36.0                          | 47.0   | -11.0          |
| 696.62         | 14.4                      | 23.8                    | 38.2                          | 47.0   | -8.8           |
| 796.00         | 15.0                      | 26.6                    | 41.6                          | 47.0   | -5.4           |
| 895.56         | 10.1                      | 26.9                    | 37.0                          | 47.0   | -10.0          |

## SUMMARY DATA

### (RADIATED EMISSION TEST)

**Model Number:** SG-1103

**Location:** Site # 1

**Tested by:** Sam Chang

**Polar:** Horizontal-10m

**Test Mode:** Mode 2

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 25°C

**Humidity:** 50%RH

(The chart below shows the highest readings taken from the final data)

| Freq.<br>(MHz) | Raw<br>Data<br>( dBuV/m ) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(dB) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|
| 72.86          | 20.6                      | 6.0                     | 26.6                          | 40.0   | -13.4          |
| 299.96         | 24.5                      | 15.6                    | 40.1                          | 47.0   | -6.9           |
| 499.97         | 18.9                      | 21.1                    | 40.0                          | 47.0   | -7.0           |
| 696.63         | 17.9                      | 23.8                    | 41.7                          | 47.0   | -5.3           |
| 796.17         | 16.9                      | 26.6                    | 43.5                          | 47.0   | -3.5           |
| 895.56         | 14.3                      | 26.9                    | 41.2                          | 47.0   | -5.8           |

## SECTION 2 EN 61000-3-2 & EN 61000-3-3 (POWER HARMONICS & VOLTAGE FLUCTUATION /FLICKER)

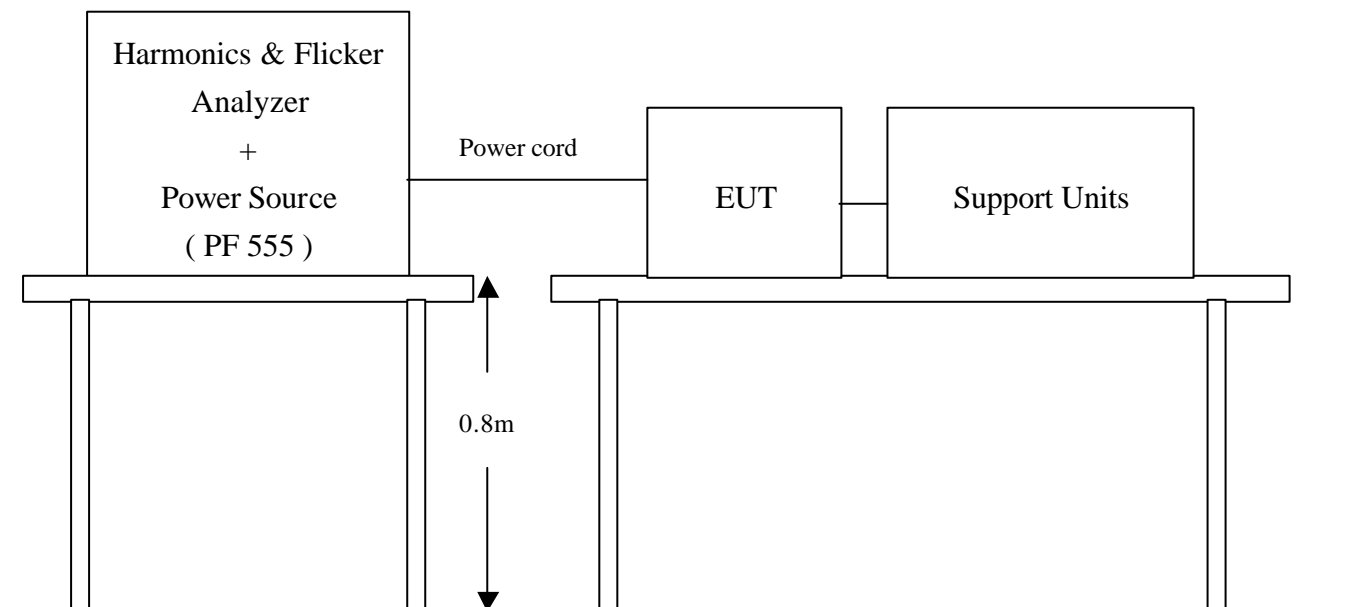
### POWER HARMONICS MEASUREMENT

**Port** : AC mains  
**Basic Standard** : EN 61000-3-2 (1995 + A1: 1998 + A2: 1998)  
**Limits** : ☒ CLASS A; ☐ CLASS D  
**Tester** : Tommy Lin  
**Temperature** : 20°C  
**Humidity** : 49%

### VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

**Port** : AC mains  
**Basic Standard** : EN 61000-3-3 (1995)  
**Limits** : Section 5 of EN 61000-3-3  
**Tester** : Tommy Lin  
**Temperature** : 20°C  
**Humidity** : 49%

### Block Diagram of Test Setup:



### Result:

Please see the attached test data.

-----  
EN 61000-3-2 TEST REPORT 2003/1/30 10:14 AM  
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Unit: IPC

Model No.: SG-1103

Remarks: TEMP:20°C HUM:49%

Operator: Tommy Lin

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TEST SETUP

-----

|                  |           |               |              |
|------------------|-----------|---------------|--------------|
| Test Freq.:      | 50.00 Hz. | Test Voltage: | 230.0 vac    |
| Waveform :       | SINE      | Test Time:    | 2.5 min.     |
| Classification : | CLASS A   | Test Type:    | STEADY-STATE |

Prog. Zo Enabled: YES Prog. Zo: 0.000

Motor Driven with Phase Angle Control: NO  
Impedance selected: DIRECT

Synthetic R+L Enabled: NO  
Resistance: 0.380 Ohms Inductance: 460.000 uH

MAX WATTS:9.3W

## TEST DATA

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Result: PASS

## Harmonic Current Results

-----

| Hn | AMPS  | LO Limit | HI Limit | Result |
|----|-------|----------|----------|--------|
| 0  | 0.000 | 0.000    | 0.000    | PASS   |
| 1  | 0.070 | NaN      | NaN      | PASS   |
| 2  | 0.001 | 1.080    | 1.080    | PASS   |
| 3  | 0.044 | 2.300    | 2.300    | PASS   |
| 4  | 0.000 | 0.430    | 0.430    | PASS   |
| 5  | 0.044 | 1.140    | 1.140    | PASS   |
| 6  | 0.000 | 0.300    | 0.300    | PASS   |
| 7  | 0.042 | 0.770    | 0.770    | PASS   |
| 8  | 0.000 | 0.230    | 0.230    | PASS   |
| 9  | 0.039 | 0.400    | 0.400    | PASS   |
| 10 | 0.000 | 0.184    | 0.184    | PASS   |
| 11 | 0.035 | 0.330    | 0.330    | PASS   |
| 12 | 0.000 | 0.153    | 0.153    | PASS   |
| 13 | 0.031 | 0.210    | 0.210    | PASS   |
| 14 | 0.000 | 0.131    | 0.131    | PASS   |
| 15 | 0.027 | 0.150    | 0.150    | PASS   |
| 16 | 0.000 | 0.115    | 0.115    | PASS   |
| 17 | 0.022 | 0.132    | 0.132    | PASS   |
| 18 | 0.000 | 0.102    | 0.102    | PASS   |
| 19 | 0.018 | 0.118    | 0.118    | PASS   |
| 20 | 0.000 | 0.092    | 0.092    | PASS   |

|    |       |       |       |      |
|----|-------|-------|-------|------|
| 21 | 0.015 | 0.107 | 0.107 | PASS |
| 22 | 0.000 | 0.084 | 0.084 | PASS |
| 23 | 0.013 | 0.098 | 0.098 | PASS |
| 24 | 0.000 | 0.077 | 0.077 | PASS |
| 25 | 0.010 | 0.090 | 0.090 | PASS |
| 26 | 0.000 | 0.071 | 0.071 | PASS |
| 27 | 0.008 | 0.083 | 0.083 | PASS |
| 28 | 0.000 | 0.066 | 0.066 | PASS |
| 29 | 0.007 | 0.078 | 0.078 | PASS |
| 30 | 0.000 | 0.061 | 0.061 | PASS |
| 31 | 0.006 | 0.073 | 0.073 | PASS |
| 32 | 0.000 | 0.058 | 0.058 | PASS |
| 33 | 0.006 | 0.068 | 0.068 | PASS |
| 34 | 0.000 | 0.054 | 0.054 | PASS |
| 35 | 0.006 | 0.064 | 0.064 | PASS |
| 36 | 0.000 | 0.051 | 0.051 | PASS |
| 37 | 0.006 | 0.061 | 0.061 | PASS |
| 38 | 0.000 | 0.048 | 0.048 | PASS |
| 39 | 0.005 | 0.058 | 0.058 | PASS |
| 40 | 0.000 | 0.046 | 0.046 | PASS |

END OF REPORT

-----  
EN 61000-3-3 TEST REPORT 2003/1/30 10:44 AM  
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Unit: IPC

Model No.: SG-1103

Remarks: TEMP:20°C HUM:49%

Operator: Tommy Lin

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TEST SETUP

-----

Test Freq.: 50.00 Hz. Test Voltage: 230.0 vac  
Waveform : SINE  
Test Time: 10.0 min. Tshort: 10.0 min.

Prog. Zo Enabled: YES Prog. Zo: 0.000

Voltage Change less than once per Hour: NO  
Impedance selected: DIRECT

Synthetic R+L Enabled: NO  
Resistance: 0.380 Ohms Inductance: 460.000 uH



## TEST DATA

-----

Result: PASS

|           | EUT Data | Limit | Result | Test Enabled |
|-----------|----------|-------|--------|--------------|
| Pst max   | 0.001    | 1.00  | PASS   | true         |
| Plt max   | 0.001    | 0.65  | PASS   | true         |
| dc %      | 0.00     | 3.00  | PASS   | true         |
| dmax %    | 0.00     | 4.00  | PASS   | true         |
| d(t) sec. | 0.00     | 0.20  | PASS   | true         |

### Power Source Data

|                |       |       |      |      |
|----------------|-------|-------|------|------|
| Source Pst max | 0.020 | 0.400 | PASS | true |
| % THD          | 0.03  | 3.00  | PASS | true |

END OF REPORT

## ***SECTION 1 - IMMUNITY TESTS (EN 55024:1998)***

**Electrostatic discharge (ESD) immunity test (IEC 61000-4-2)**

**Radiated electromagnetic field (RS) immunity test  
(IEC 61000-4-3)**

**Fast transient / Burst (EFT) immunity test (IEC 61000-4-4)**

**Surge immunity test (IEC 61000-4-5)**

**Conducted disturbances inducted by radio-frequency fields,  
(CS) immunity test (IEC 61000-4-6)**

**Power-frequency magnetic field immunity test (IEC 61000-4-8)**

**Voltage dips, short interruption and voltage variation  
immunity test (IEC 61000-4-11)**

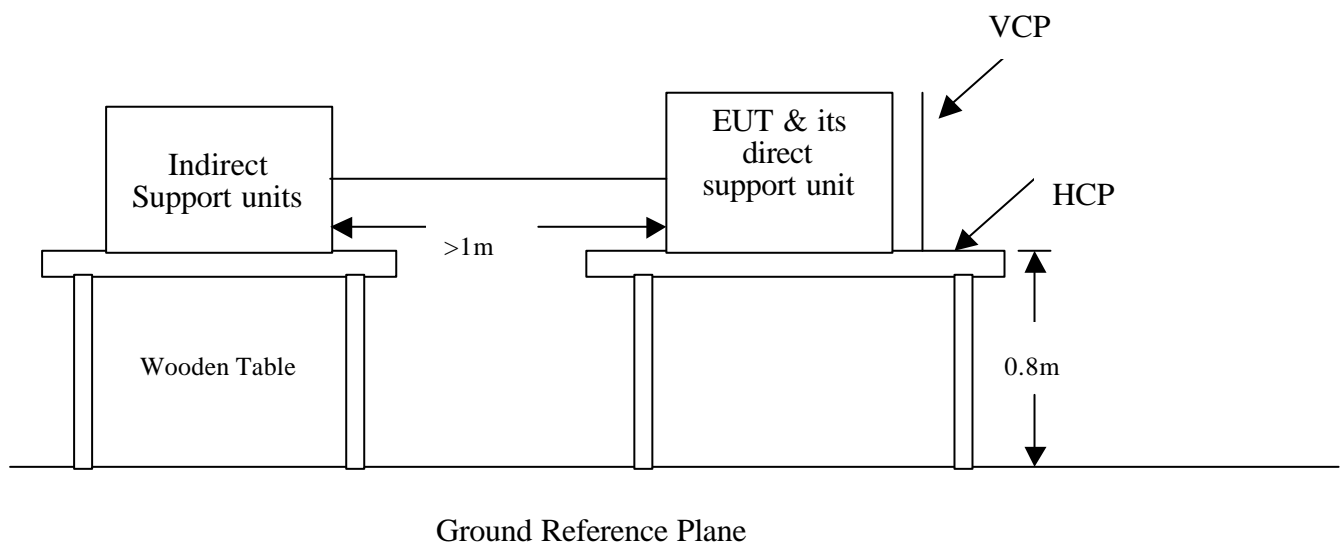
## 1. IEC 61000-4-2

### ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

|                             |   |
|-----------------------------|---|
| <b>Port</b>                 | : Enclosure   |
| <b>Basic Standard</b>       | : IEC 61000-4-2   |
| <b>Requirements</b>         | : $\pm 8$ kV (Air Discharge)<br>$\pm 4$ kV (Contact Discharge)<br>$\pm 4$ kV (Indirect Discharge) |
| <b>Performance Criteria</b> | : B (Standard require)  |
| <b>Tester</b>               | : Tommy Lin   |
| <b>Temperature</b>          | : 20°C  |
| <b>Humidity</b>             | : 49%   |
| <b>Pressure</b>             | : 1002 mbar   |

#### **Block Diagram of Test Setup:**

( The 470 k ohm resistors are installed per standard requirement )



## **Test Procedure:**

1. The EUT was located 0.1 m minimum from all side of the HCP.
2. The indirect support units were located 1 m minimum 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.
3. A scroll 'H' test program was loaded and executed in Linux mode.
4. The EUT sent above message to monitor and related peripherals through the test.
5. Active the communication function if the EUT with such port(s).
6. As per the requirement of EN 55024; applying direct contact discharge at the sides other than front of EUT at minimum 50 discharges (25 positive and 25 negative) if applicable, can't be applied direct contact discharge side of EUT then the indirect discharge shall be applied. One of the test points shall be subjected to at least 50 indirect discharge (contact) to the front edge of horizontal coupling plane.
7. Other parts of EUT where it is not possible to perform contact discharge then selecting appropriate points of EUT for air discharge, a minimum of 10 single air discharges shall be applied.
8. The application of ESD to the contact of open connectors is not required.
9. The EUT direct connection units also need to be applied ESD at the port of EUT cable connected.
10. Putting a mark on EUT to show tested points. The following test condition was followed during the tests.

**Note:** As per IEC 61000-4-2: 2001, with two 470k bleed resistors cable is connected between the EUT and HCP during the test applicable for power ungrounded or battery operating unit only.

The electrostatic discharges were applied as follows:

| Amount of Discharges | Voltage | Coupling                       | Result (Pass/Fail) |
|----------------------|---------|--------------------------------|--------------------|
| Mini 25 / Point      | ± 4kV   | Contact Discharge              | Pass               |
| Mini 10 / Point      | ± 8kV   | Air Discharge                  | Pass               |
| Mini 25 / Point      | ± 4kV   | Indirect Discharge HCP (Front) | Pass               |
| Mini 25 / Point      | ± 4kV   | Indirect Discharge VCP (Left)  | N/A                |
| Mini 25 / Point      | ± 4kV   | Indirect Discharge VCP (Back)  | N/A                |
| Mini 25 / Point      | ± 4kV   | Indirect Discharge VCP (Right) | N/A                |

The tested points to EUT, please refer to attached pages.

(Blue arrow mark for contact discharge, red arrow mark for air discharge.)

## **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

**Observation: No any function degraded during the tests.**

## *The Tested Points of EUT*

(Photo 1 of 4)



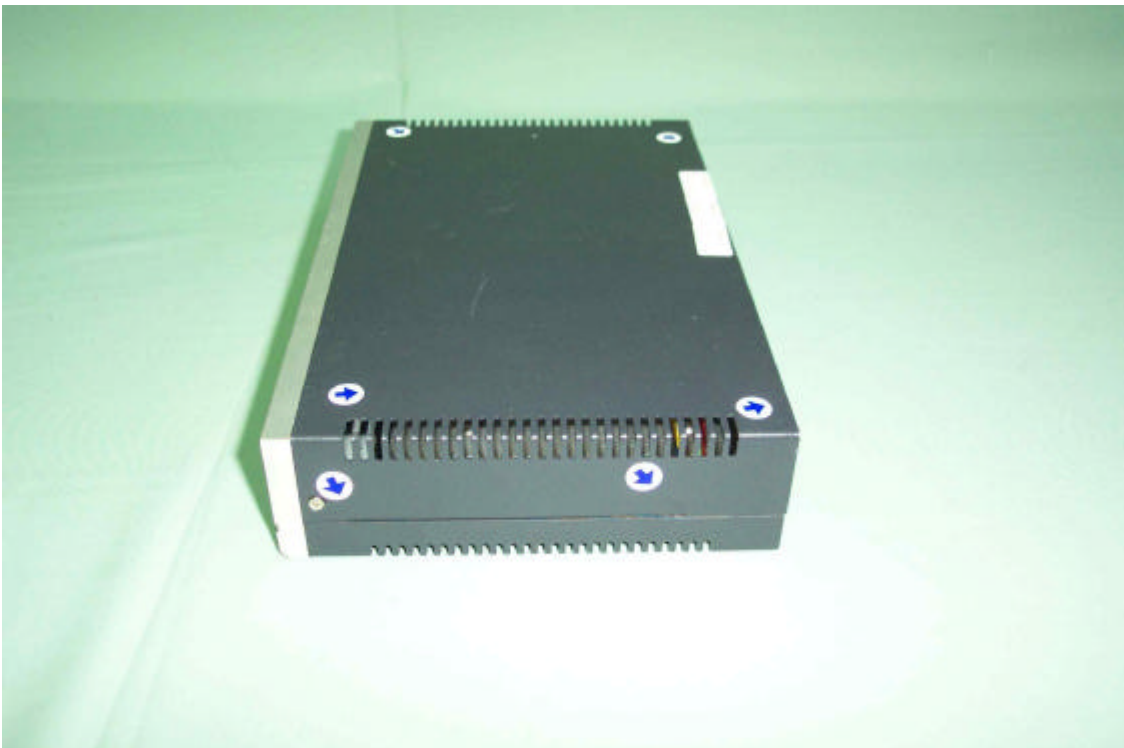
(Photo 2 of 4)



(Photo 3 of 4)



(Photo 4 of 4)

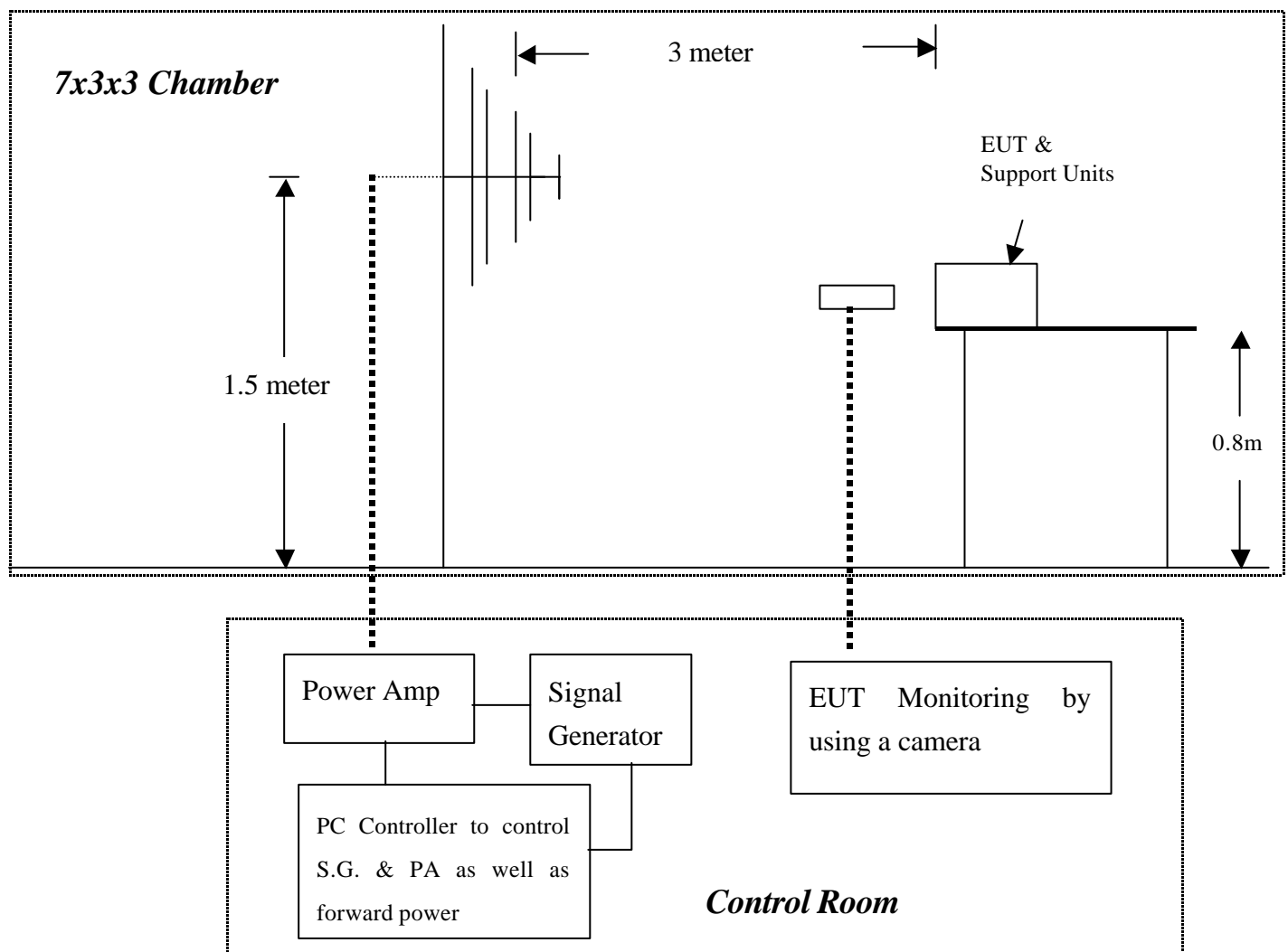


## 2. IEC 61000-4-3

### RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

|                             |   |
|-----------------------------|---|
| <b>Port</b>                 | : Enclosure   |
| <b>Basic Standard</b>       | : IEC 61000-4-3   |
| <b>Requirements</b>         | : 10 V/m / with 80% AM. 1kHz Modulation. (Customer requested) |
| <b>Performance Criteria</b> | : A (Standard require)  |
| <b>Tester</b>               | : Tommy Lin   |
| <b>Temperature</b>          | : 20°C  |
| <b>Humidity</b>             | : 49%   |
| <b>Pressure</b>             | : 1002 mbar   |

#### Block Diagram of Test Setup:



### **Test Procedure:**

1. The EUT was located at the edge of supporting table keep 3 meter away from transmitting antenna, it just the calibrated square area of field uniformity. The support units were located outside of the uniformity area, but the cable(s) connected with EUT were exposed to the calibrated field as per IEC 61000-4-3.
2. A scroll 'H' messages were displayed on part of screen of monitor and an enlarged 'H' characters were displayed on the other part of screen of monitor.
3. Adjusting the monitoring camera to monitor the 'H' message as clear as possible.
4. Setting the testing parameters of RS test software per IEC 61000-4-3.
5. Performing the pre-test at each side of with double specified level (6V/m) at 4% steps.
6. From the result of pre-test in step 5, choice the worst side of EUT for final test from 80 MHz to 1000 MHz at 1% steps.
7. Recording the test result in following table.
8. It is not necessary to perform test as per annex A of EN 55024 if the EUT doesn't belong to ITE product.

### **IEC 61000-4-3 Final test conditions:**

Test level : 10V/m

Steps : 1 % of fundamental

Dwell Time : 3 sec

| Range (MHz) | Field | Modulation | Polarity | Position (°) | Result (Pass/Fail) |
|-------------|-------|------------|----------|--------------|--------------------|
| 80-1000     | 10V   | Yes        | H        | Front        | Pass               |
| 80-1000     | 10V   | Yes        | V        | Front        | Pass               |
| 80-1000     | 10V   | Yes        | H        | Right        | Pass               |
| 80-1000     | 10V   | Yes        | V        | Right        | Pass               |
| 80-1000     | 10V   | Yes        | H        | Back         | Pass               |
| 80-1000     | 10V   | Yes        | V        | Back         | Pass               |
| 80-1000     | 10V   | Yes        | H        | Left         | Pass               |
| 80-1000     | 10V   | Yes        | V        | Left         | Pass               |



### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self-recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

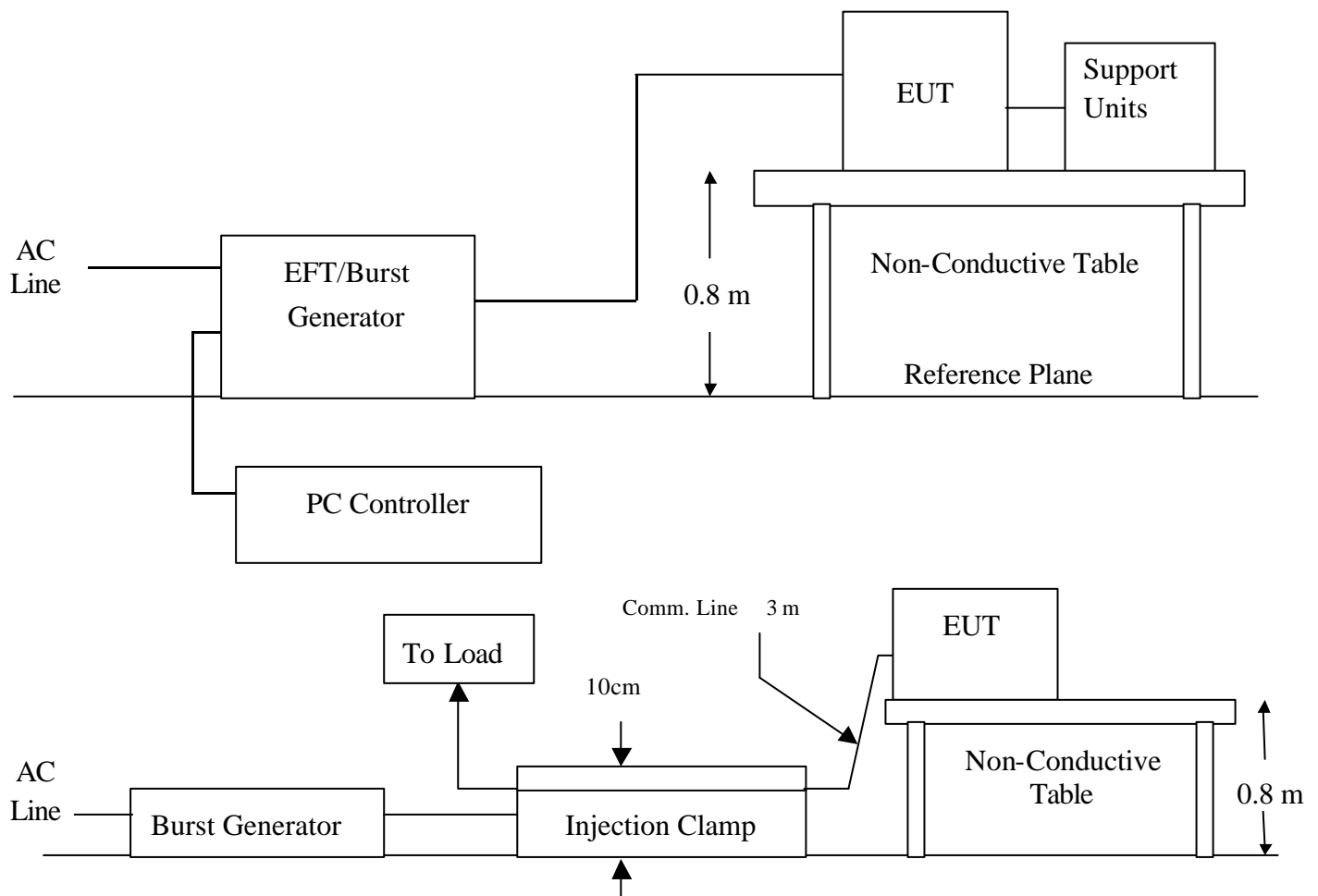
**Observation: No any function degraded during the tests.**

### 3. IEC 61000-4-4

#### FAST TRANSIENTS/BURST IMMUNITY TEST

|                             |   |
|-----------------------------|---|
| <b>Port</b>                 | : On Power Lines and Data Cable   |
| <b>Basic Standard</b>       | : IEC 61000-4-4   |
| <b>Requirements</b>         | : $\pm 1\text{kV}$ for Power Supply Lines<br>$\pm 0.5\text{kV}$ for LAN Cable |
| <b>Performance Criteria</b> | : B (Standard require)  |
| <b>Tester</b>               | : Tommy Lin   |
| <b>Temperature</b>          | : $20^{\circ}\text{C}$  |
| <b>Humidity</b>             | : 49%   |
| <b>Pressure</b>             | : 1002 mbar   |

#### Block Diagram of Test Setup:



### **Test Procedure:**

1. EUT and support units were located on a wooden table 0.8 m away from ground reference plane.
2. A 1.0 meter long power cord was attached to EUT during the test.
3. The length of communication cable between communication port and clamp was keeping within 1 meter.
4. A test program was loaded and executed in Linux mode.
5. The data was sent to the screen of monitor and filling the screens with upper case of "H" patterns.
6. The test program exercised related support units sequentially.
7. Repeating step 3 to 6 through the test and increase test voltage to the EUT ports from minimum to standard request or client request.
8. Recording the test result as shown in following table.

#### **Test conditions:**

Impulse Frequency:5kHz

Tr/Th: 5/50ns

Burst Duration: 15ms

Burst Period: 3Hz

| Inject Line | Voltage kV | Inject Method | Result (Pass/Fail) |
|-------------|------------|---------------|--------------------|
| L1          | $\pm 1$    | Direct        | Pass               |
| N           | $\pm 1$    | Direct        | Pass               |
| L1+N        | $\pm 1$    | Direct        | Pass               |
| LAN Cable   | $\pm 0.5$  | Clamp         | Pass               |

### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**      ☐ **FAILED**

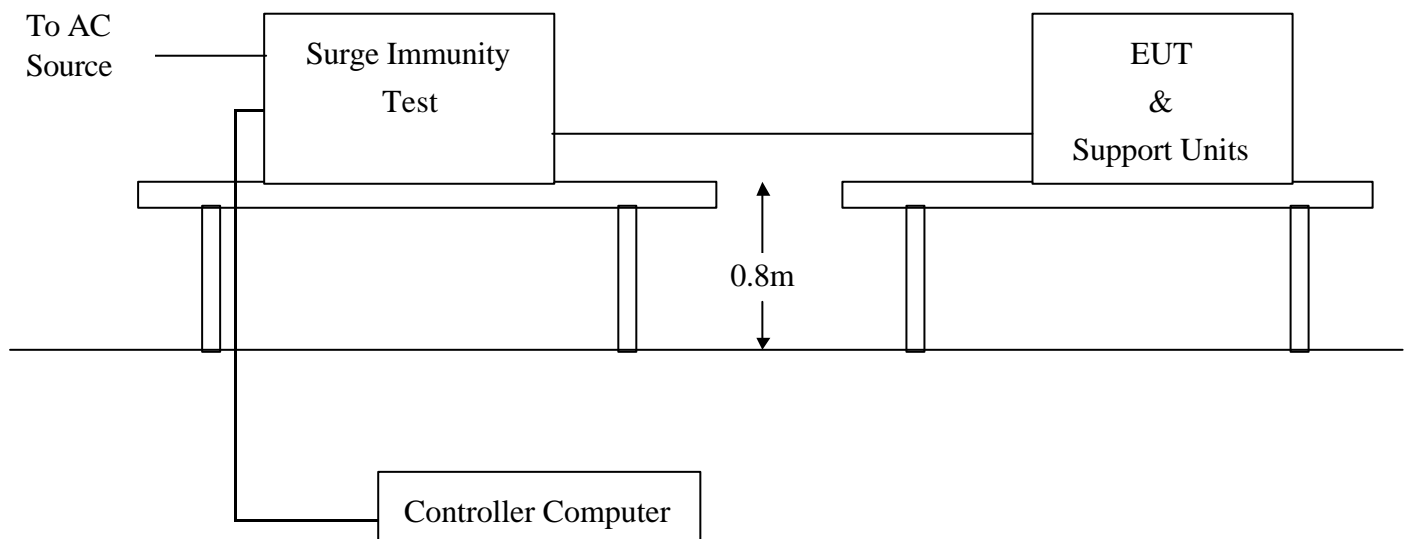
**Observation: No any function degraded during the tests.**

## 4. IEC 61000-4-5

### SURGE IMMUNITY TEST

|                             |                                    |
|-----------------------------|------------------------------------|
| <b>Port</b>                 | : Power Cord                       |
| <b>Basic Standard</b>       | : IEC 61000-4-5                    |
| <b>Requirements</b>         | : $\pm 1\text{kV}$ ( Line to Line) |
| <b>Performance Criteria</b> | : B (Standard require)             |
| <b>Tester</b>               | : Tommy Lin                        |
| <b>Temperature</b>          | : 20°C                             |
| <b>Humidity</b>             | : 49%                              |
| <b>Pressure</b>             | : 1002 mbar                        |

#### Block Diagram of Test Setup:



### **Test Procedure:**

1. The EUT and support units were located on a wooden table 0.8 m away from ground floor.
2. A test program was loaded and executed in Linux mode.
3. The data was sent to the screen of monitor and filling the screens with upper case of "H" patterns.
4. The test program exercised related support units sequentially.
5. Repeating step 3 to 4 through the test and increase test voltage to the EUT ports from minimum to standard request or client request.
6. Recording the test result as shown in following table.

### **Test conditions:**

Voltage Waveform : 1.2/50 us  
Current Waveform : 8/20 us  
Polarity : Positive/Negative  
Phase angle : 0°, 90°, 270°  
Number of Test : 5

| Coupling Line | Voltage (kV) | Polarity | Coupling Method | Result (Pass/Fail) |
|---------------|--------------|----------|-----------------|--------------------|
| L1-L2         | 1            | Positive | Capacitive      | Pass               |
| L1-L2         | 1            | Negative | Capacitive      | Pass               |

### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self-recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

**Observation: No any function degraded during the tests.**

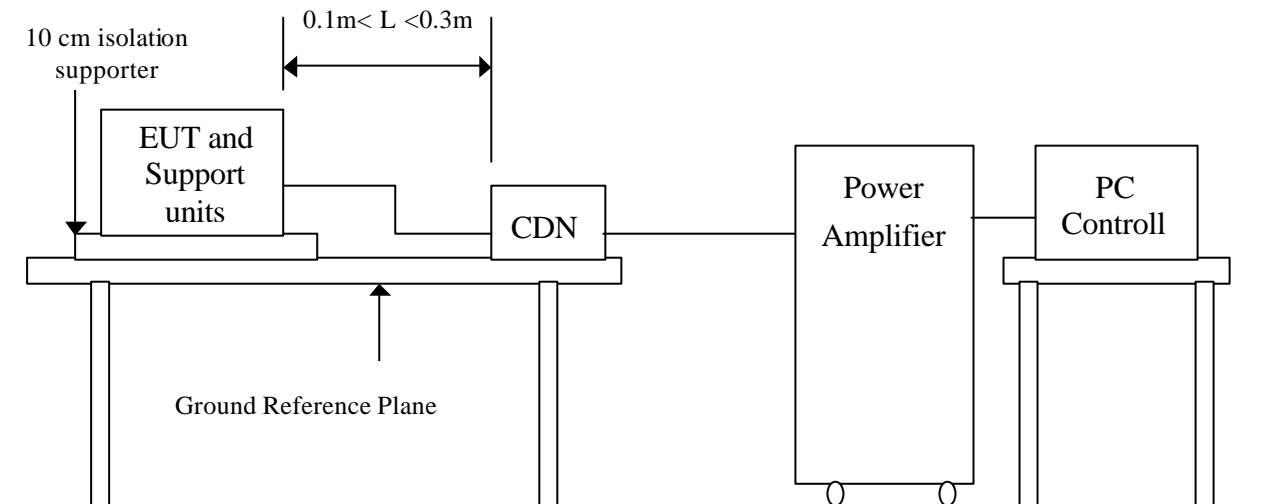
## 5. IEC 61000-4-6

### (CONDUCTED DISTURBANCE/INDUCED BY RADIO-FREQUENCY FIELD)

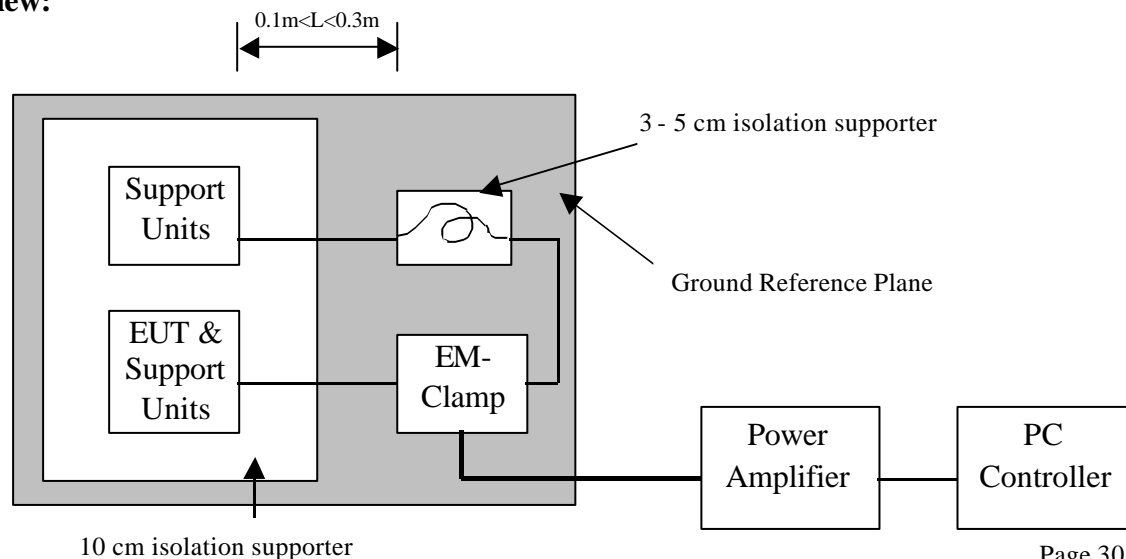
|                             |   |
|-----------------------------|---|
| <b>Port</b>                 | : AC Port and LAN Cable                             |
| <b>Base Standard</b>        | : IEC 61000-4-6                                     |
| <b>Requirements</b>         | : 10 V with 80% AM. Modulation (Customer requested) |
| <b>Injection Method</b>     | : CDN-M2 for Power Cord<br>EM-Clamp for LAN Cable   |
| <b>Performance Criteria</b> | : A (Standard require)                              |
| <b>Tester</b>               | : Tommy Lin   |
| <b>Temperature</b>          | : 20°C  |
| <b>Humidity</b>             | : 49%   |
| <b>Pressure</b>             | : 1002 mbar   |

#### Block Diagram of Test Setup:

##### Side view:



##### Top view:



## **Test Procedure:**

1. The EUT and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
2. A 'H' messages were displayed on screen of monitor.
3. Adjusting the monitoring camera to monitor the 'H' message as clear as possible.
4. Setting the testing parameters of CS test software per IEC 61000-4-6.
5. Recording the test result in following table.

### **Test conditions:**

Frequency Range : 0.15MHz-80MHz  
Frequency Step : 1% of fundamental  
Dwell Time : 3 sec

| Range (MHz) | Field | Modulation | Result (Pass/Fail) |
|-------------|-------|------------|--------------------|
| 0.15-80     | 10V   | Yes        | Pass               |

## **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self-recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

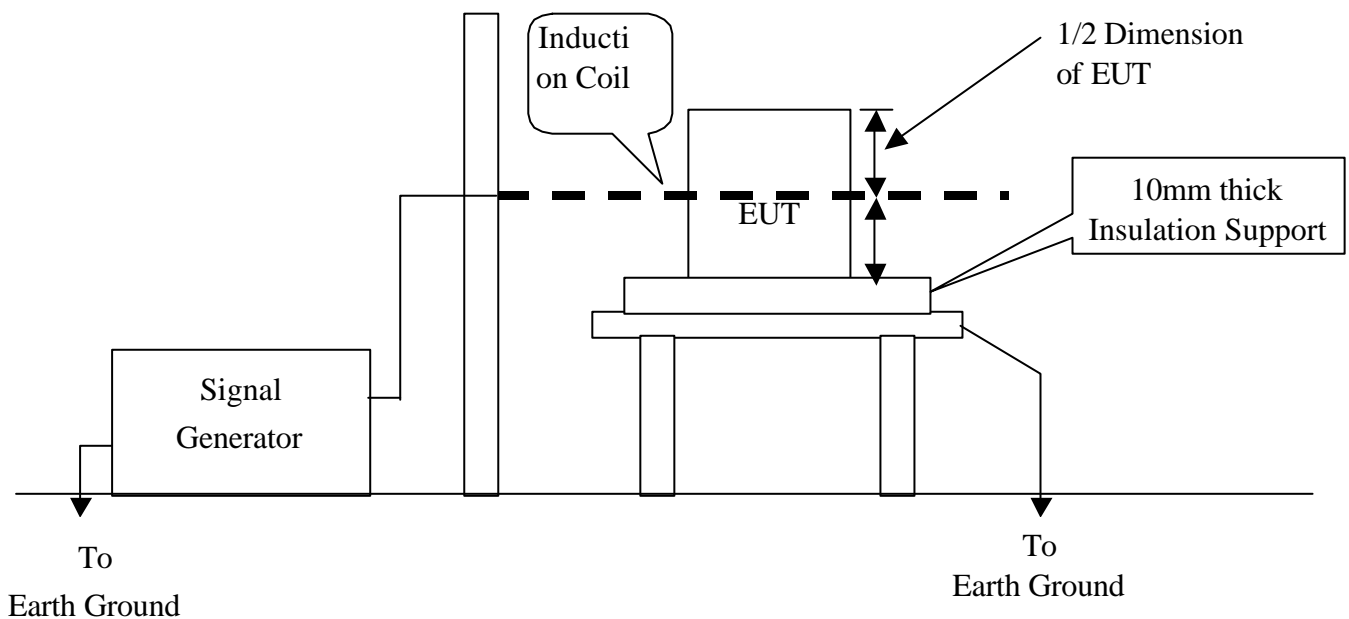
**Observation: No any function degraded during the tests.**

## 6. IEC 61000-4-8

### (POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST)

|                      |                               |
|----------------------|-------------------------------|
| Port                 | : Enclosure                   |
| Basic Standard       | : IEC 61000-4-8               |
| Requirements         | : 30 A/m (Customer requested) |
| Performance Criteria | : A (Standard Required)       |
| Tester               | : Lung Tsai                   |
| Temperature          | : 20°C                        |
| Humidity             | : 49%                         |
| Pressure             | : 1002 mbar                   |

#### Block Diagram of Test Setup:





### **Test Procedure:**

1. The EUT and support units were located on Ground Reference Plane with the interposition of a 0.1 m thickness insulation support.
2. Putting the induction coil on horizontal direction.( X direction )
3. A test program was loaded and executed in Linux mode.
4. The data was sent to the screen of monitor and filling the screen with upper case of "H" patterns.
5. The test program exercised related support units sequentially.
6. Repeating step 3 to 5 through the test.
7. Recording the test result as shown in following table.
8. Rotating the induction coil by 90° ( Y direction ) then repeat step 3 to 7.
9. Rotating the induction coil by 90 ° again ( Z direction ) then repeat step 3 to 7.

\*. Test conditions:

Field Strength : 30A/m

Power Freq. : 50Hz

Orientation : X, Y, Z

| Orientation | Field | Result (Pass/Fail) | Remark |
|-------------|-------|--------------------|--------|
| X           | 30A   | Pass               |        |
| Y           | 30A   | Pass               |        |
| Z           | 30A   | Pass               |        |

### **Performance & Result:**

- ☒ **Criteria A:** The apparatus continues to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance.
- ☐ **Criteria B:** The apparatus continues to operate as intended after the test. 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- ☐ **Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

**Observation: No any function degraded during the tests.**

## 7. IEC 61000-4-11

### (VOLTAGE DIPS / SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS)

#### VOLTAGE DIPS / SHORT INTERRUPTIONS

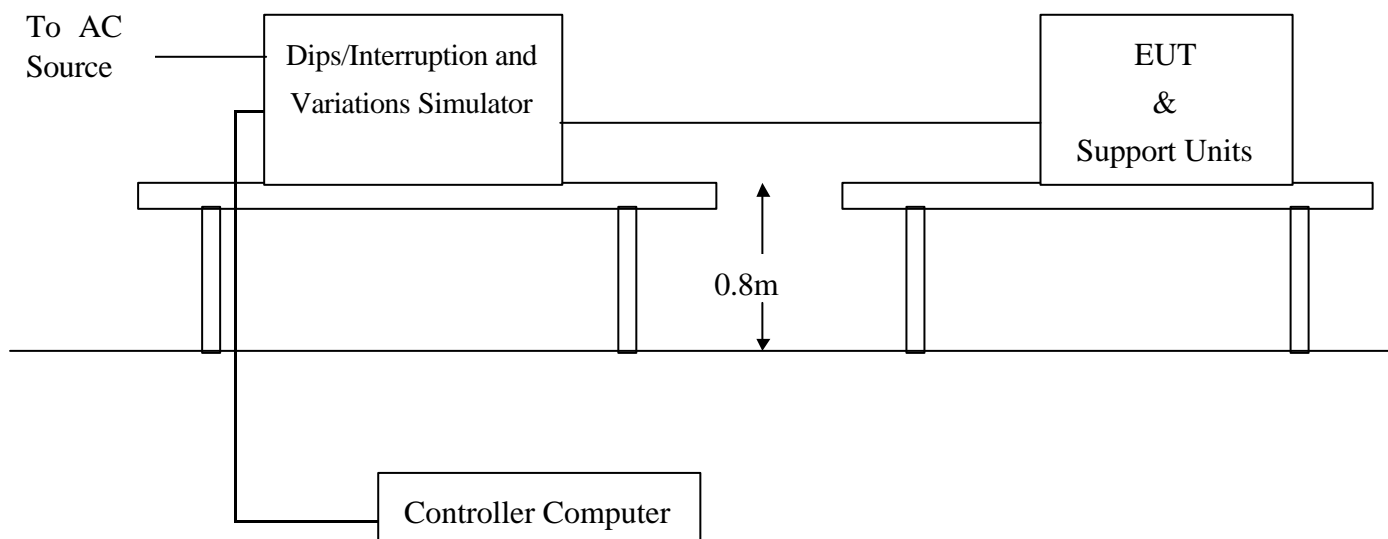
**Port** : AC mains  
**Basic Standard** : IEC 61000-4-11 (1994)  
**Requirement** : PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

| Voltage<br>Dips | Test Level | Reduction | Duration | Performance |
|-----------------|------------|-----------|----------|-------------|
|                 | % $U_T$    | (%)       |          | Criteria    |
|                 | <5         | >95       | 0.5      | B           |
|                 | 70         | 30        | 25       | C           |

| Voltage<br>Interceptions | Test Level | Reduction | Duration | Performance |
|--------------------------|------------|-----------|----------|-------------|
|                          | % $U_T$    | (%)       |          | Criteria    |
|                          | <5         | >95       | 250      | C           |

**Test Interval** : Min. 10 sec.  
**Tester** : Tommy Lin  
**Temperature** : 20°C  
**Humidity** : 49%  
**Pressure** : 1002 mbar

#### Block Diagram of Test Setup:



## **Test Procedure:**

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. A test program was loaded and executed in Linux mode.
3. The data was sent to the screen of monitor and filling the screens with upper case of "H" patterns.
4. The test program exercised related support units sequentially.
5. Setting the parameter of tests and then Perform the test software of test simulator.
6. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
7. Repeating step 3 to 4 through the test.
8. Recording the test result in test record form.

### **Test conditions:**

The duration with a sequence of three dips/interruptions with interval of 10 s minimum  
( Between each test event )

### **Voltage Dips:**

| Test Level<br>% U <sub>T</sub> | Reduction<br>(%) | Duration<br>( periods) | Observation | Meet Performance<br>Criteria |
|--------------------------------|------------------|------------------------|-------------|------------------------------|
| 0                              | 100              | 0.5                    | Normal      | A                            |
| 70                             | 30               | 25                     | Normal      | A                            |

### **Voltage Interruptions:**

| Test Level<br>% U <sub>T</sub> | Reduction<br>(%) | Duration<br>( periods) | Observation   | Meet Performance<br>Criteria |
|--------------------------------|------------------|------------------------|---|------------------------------|
| 0                              | 100              | 250                    | EUT shut down but can<br>be recovered by manual,<br>as the events disappears. | C                            |

**Normal:** No any functions degrade during and after the test.

## **Performance & Result:**

- Criteria A:** The apparatus continues to operate as intended. 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. In some cases the performance level may be replaced by a permissible loss of performance.
- Criteria B:** The apparatus continues to operate as intended after the test. 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. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed.
- Criteria C:** Temporary loss of function is allowed, provided the functions self recoverable or can be restored by the operation of controls.

☒ **PASS**

☐ **FAILED**

## **APPENDIX 1**

### **PHOTOGRAPHS OF TEST SETUP**

## LINE CONDUCTED EMISSION TEST (EN 55022)

*Front View*



*Back View*



## RADIATED EMISSION TEST (EN 55022)

*Front View*



*Back View*





## POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST (EN 61000-3-2, EN 61000-3-3)

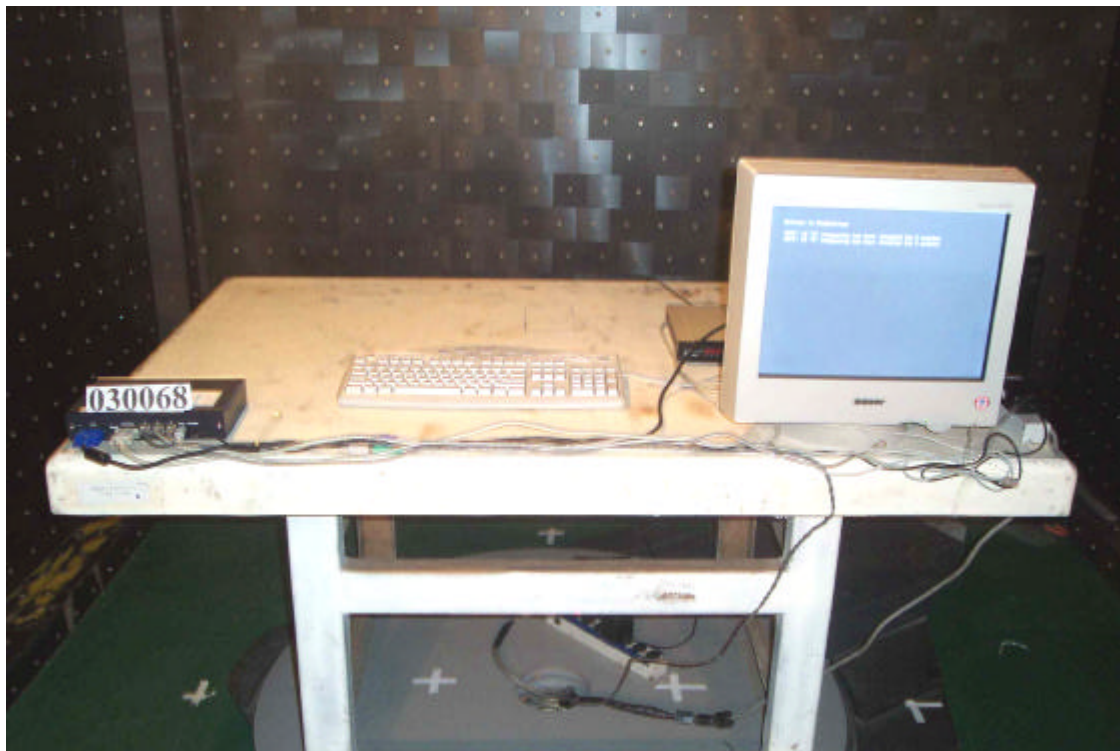


## ELECTROSTATIC DISCHARGE TEST (IEC 61000-4-2)





## RADIATED ELECTROMAGNETIC FIELD (IEC 61000-4-3)



## FAST TRANSIENTS/BURST TEST (IEC 61000-4-4)



## SURGE IMMUNITY TEST (IEC 61000-4-5)

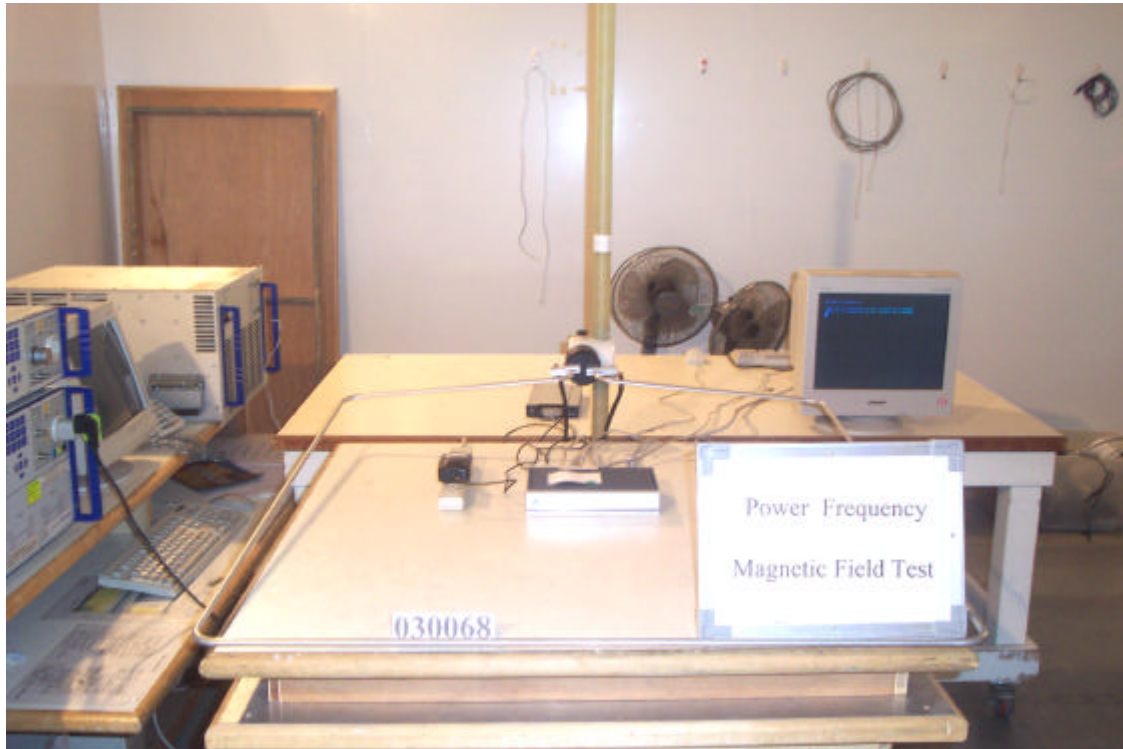




## CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST (IEC 61000-4-6)



## POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (IEC 61000-4-8)



## VOLTAGE DIPS / INTERRUPTION TEST (IEC 61000-4-11)



## **APPENDIX 2**

### **PHOTOGRAPHS OF EUT**



*Front View of EUT*



*Back View of EUT*





*Left View of EUT*



*Right View of EUT*



*Bottom View of EUT*

