



EMC UPDATE TEST REPORT

For

Advantech Co., Ltd.

LCD Monitor with Touch Screen

Model: FPM-3150TVE; FPM-3150TVE-T

Trade Name: ADVANTECH

Date of Test: March 1 ~ 4, 2004

Revision: 01

Description of Rev. 01:

1. Applicant modifies applicant and manufacturer address as per customer requested.
2. Applicant changes product name to LCD Monitor with Touch Screen.
3. Applicant adds one A/D Board to re-test.
(Please refer to have ** mark items on this report)
4. Other information, please refer to the 010216 and this test report.

Approved by:

Reviewed by:

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1 TEST RESULT CERTIFICATION

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.

Equipment Under Test: LCD Monitor with Touch Screen

Trade Name: ADVANTECH

Model: FPM-3150TVE; FPM-3150TVE-T

Detailed EUT Description: See Item 2 of this report

Date of Test: March 1 ~ 4, 2004

| Applicable Standard | Class/Limit/Criterion | Test Result |
|---|-----------------------|-------------------------|
| EN 55022: 1998 | Class B | No non-compliance noted |
| EN 61000-3-2: 2000 | Class D | Please refer to page 13 |
| EN 61000-3-3: 1995 + A1: 2001 | Limit | No non-compliance noted |
| EN 55024: 1998, including | | |
| IEC 61000-4-2: 1995 + A2: 2000 | Criterion B | No non-compliance noted |
| IEC 61000-4-3: 1995 + A2: 2000 | Criterion A | No non-compliance noted |
| IEC 61000-4-4: 1995 + A1: 2000 | Criterion B | No non-compliance noted |
| IEC 61000-4-5: 1995 + A1: 2000 | Criterion B | No non-compliance noted |
| IEC 61000-4-6: 1996 + A1: 2000 | Criterion A | No non-compliance noted |
| IEC 61000-4-8: 1993 + A1: 2000 | Criterion A | No non-compliance noted |
| IEC 61000-4-11: 1994 + A1: 2000 | Criterion B/C/C | No non-compliance noted |
| Deviation from Applicable Standard | | |
| According to applicant's declaration this EUT is a class A product and to be market in industrial environment only. | | |

The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in the EMC Directive 89/336/EEC and 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.



2 EUT DESCRIPTION

| | | | |
|-------------------------------------|-------------------------------|--------------|-------------|
| Product | LCD Monitor with Touch Screen | | |
| Trade Name | ADVANTECH | | |
| Model | FPM-3150TVE; FPM-3150TVE-T | | |
| Housing Type | Metal Case | | |
| EUT Power Rating | DCV from Power Adapter | | |
| OSC/Clock Frequencies | 20MHz | | |
| 15.0" LCD Panel Manufacturer | CHUNGHWA | Model | CLAA150XA03 |
| **A/D Board Manufacturer | BIEN | Model | R04 |

I/O PORT OF EUT:

| I/O PORT TYPES | Q'TY | TESTED WITH |
|-----------------------|-------------|--------------------|
| 1.) Serial Port | 1 | 1 |
| 2.) Video Port (VGA) | 1 | 1 |

Note: 1. Difference specification of model numbers is FPM-3150TVE-T with touch screen and FPM-3150TVE without touch screen.

**2. Client consigns only one sample to test (Model Number: FPM-3150TVE-T). Therefore, the testing Lab. just guarantees the unit, which has been tested.



3 TEST METHODOLOGY

3.1 DECISION OF FINAL TEST MODE

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

Mode 1

1024 × 768, 75Hz Resolution

Mode 2

800 × 600, 75Hz Resolution

2. After preliminary test, found mode 1 producing the highest emission level, used this mode for all final test.

4 SETUP OF EQUIPMENT UNDER TEST

Setup Diagram

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

Support Equipment

| No. | Equipment | Model No. | Serial No. | FCC ID | Trade Name | Data Cable | Power Cord |
|-----|--------------------------------------|------------|-------------|-----------|------------|----------------|---|
| 1 | PC | DN076A-AB0 | TWL34200L8 | FCC DoC | Compaq | N/A | Unshielded, 1.8m |
| 2 | Printer | STYLUS C60 | DR3K041995 | FCC DoC | EPSON | Shielded, 1.8m | Unshielded, 1.8m |
| 3 | PS/2 Keyboard | Y-SP29 | SYU30272826 | FCC DoC | Logitech | Shielded, 1.8m | N/A |
| 4 | PS/2 Mouse | M-S43 | LZA93406262 | DZL211106 | Logitech | Shielded, 1.8m | N/A |
| | Power Adapter (For EUT Test Only) | LE-9702B | N/A | N/A | LE | N/A | AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.5m with a core |

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

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



5 INSTRUMENT AND CALIBRATION

5.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2 TEST AND MEASUREMENT EQUIPMENT

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective manual.

Equipment Used for Emission Measurement

| Conducted Emission Test Site # 3 | | | | |
|----------------------------------|--------------|---------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| EMI Test Receiver | R&S | ESHS30 | 828144/003 | 08/07/2004 |
| LISN | R&S | ESH2-Z5 | 843285/010 | 01/08/2005 |
| LISN | EMCO | 3825/2 | 9003-1628 | 07/27/2004 |

Note: The measurement uncertainty is less than +/- 2.83dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

| Open Area Test Site # 4 | | | | |
|-------------------------|----------------|--------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Spectrum Analyzer | ADVANTEST | R3132 | 91700456 | N.C.R |
| EMI Test Receiver | R&S | ESVS10 | 846285/016 | 04/10/2004 |
| Bilog Antenna | Sunol Sciences | JB1 | A111203 | 01/09/2005 |
| Turn Table | Chance most | N/A | N/A | N.C.R |
| Antenna Tower | Chance most | N/A | N/A | N.C.R |
| Controller | Chance most | N/A | N/A | N.C.R |
| RF Switch | ANRITSU | MP59B | M51067 | N.C.R |
| Site NSA | C&C Lab. | N/A | N/A | 08/08/2004 |

Note: The measurement uncertainty is less than +/- 3.36dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



| Power Harmonic & Voltage Fluctuation/Flicker Measurement (EN 61000-3-2&-3-3) | | | | |
|--|--------------|----------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| HARMONICS SYSTEM | EMC-PARTNER | HARMONICS-1000 | 094 | 10/26/2004 |

Equipment Used for Immunity Measurement

| ESD Test Site (IEC/EN 61000-4-2) | | | | |
|----------------------------------|--------------|-------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| ESD Generator | EM TEST | P30C | 0603-01 | 02/26/2005 |

| Radiated Electromagnetic Field Immunity Test Site (IEC/EN 61000-4-3) | | | | |
|--|--------------|----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| S.G. | R&S | SMY02 | 100094 | 08/05/2004 |
| Power Meter | R&S | NRVD | 837794/029 | N.C.R. |
| Power Amplifier | ar | 150W1000 | 300300 | N.C.R. |
| Power Antenna | EMCO | 93141 | 9712-1083 | N.C.R. |

| Fast Transients/Burst Test Site (IEC/EN 61000-4-4) | | | | |
|--|----------------|--------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Fast Transients/Burst Generator | HAEFELY TRENCH | PEFT- JUNIOR | 583 333-117 | 08/19/2004 |

| Surge Immunity Test Site (IEC/EN 61000-4-5) | | | | |
|---|----------------|-------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Surge Tester | HAEFELY TRENCH | PSUGER 4010 | 583 334-71 | 08/19/2004 |

| CS Test Site (IEC/EN 61000-4-6) | | | | |
|---------------------------------|--------------|----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| S.G. | R&S | SMY02 | 100094 | 08/05/2004 |
| Power Meter | R&S | NRVD | 837794/029 | N.C.R. |
| Power Amplifier | ar | 500A100A | 300299 | N.C.R. |
| CDN | Lüthi | 801-M3 | 1879 | 03/03/2005 |
| CDN | FRANKONIA | CDN-M2 | A3002010 | 04/27/2004 |



| Power Frequency Magnetic Field Immunity Test Site (IEC/EN 61000-4-8) | | | | |
|--|-------------------|-----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| TRIAX ELF Magnetic Field Meter | F.W.BELL | 4090 | 9711 | 11/13/2004 |
| Magnetic Field Tester | HAEFELY TRENCH | MAG 100.1 | 080 938-01 | N.C.R |

| Voltage Dips/Short Interruption and Voltage Variation Immunity Test Site (IEC/EN 61000-4-11) | | | | |
|--|-------------------|------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Dips/Interruption and Variations Simulator | HAEFELY TRENCH | PLINE 1610 | 080 344-05 | 03/27/2004 |



6 TEST RESULTS

Line Conducted Emission

Model: FPM-3150TVE-T**Test Mode:** Mode 1**Temperature:** 20°C**Humidity:** 63% RH**Tested by:** Michael Chen**Test Results:** Pass

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

| Freq. (MHz) | Q.P. Raw (dBuV) | AVG Raw (dBuV) | Q.P. Limit (dBuV) | AVG Limit (dBuV) | Q.P. Margin (dB) | AVG Margin (dB) | NOTE |
|----------------|-----------------------|----------------------|-------------------------|------------------------|------------------------|-----------------------|------|
| 0.155 | 37.30 | --- | 79.00 | 66.00 | -41.70 | --- | L1 |
| 2.630 | 38.90 | --- | 73.00 | 60.00 | -34.10 | --- | L1 |
| 5.260 | 36.10 | --- | 73.00 | 60.00 | -36.90 | --- | L1 |
| 13.090 | 36.30 | --- | 73.00 | 60.00 | -36.70 | --- | L1 |
| 19.630 | 41.80 | --- | 73.00 | 60.00 | -31.20 | --- | L1 |
| 23.560 | 30.50 | --- | 73.00 | 60.00 | -42.50 | --- | L1 |
| 0.155 | 37.20 | --- | 79.00 | 66.00 | -41.80 | --- | L2 |
| 2.570 | 37.60 | --- | 73.00 | 60.00 | -35.40 | --- | L2 |
| 5.140 | 36.70 | --- | 73.00 | 60.00 | -36.30 | --- | L2 |
| 13.090 | 34.80 | --- | 73.00 | 60.00 | -38.20 | --- | L2 |
| 19.630 | 41.80 | --- | 73.00 | 60.00 | -31.20 | --- | L2 |
| 26.170 | 36.10 | --- | 73.00 | 60.00 | -36.90 | --- | L2 |

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

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

**Radiated Emission (A)****Model:** FPM-3150TVE-T**Test Mode:** Mode 1**Temperature:** 19°C**Humidity:** 69% RH**Detector Function:** Quasi-peak.**Antenna:** Vertical at 10m**Tested by:** Michael Chen**Test Results:** Pass

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

| Freq. (MHz) | Raw Data (dBuV) | Corr. Factor (dB/m) | Emiss. Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) |
|----------------|-----------------------|---------------------------|-----------------------------|--------------------|----------------|
| 32.71 | 14.6 | 19.9 | 34.5 | 40.0 | -5.5 |
| 39.25 | 19.2 | 16.1 | 35.3 | 40.0 | -4.7 |
| 45.80 | 23.0 | 11.9 | 34.9 | 40.0 | -5.1 |
| 52.36 | 24.5 | 8.8 | 33.3 | 40.0 | -6.7 |
| 65.43 | 23.4 | 9.1 | 32.5 | 40.0 | -7.5 |
| 459.76 | 12.8 | 22.7 | 35.5 | 47.0 | -11.5 |
| 576.59 | 7.4 | 24.8 | 32.2 | 47.0 | -14.8 |

**Radiated Emission (B)****Model:** FPM-3150TVE-T**Test Mode:** Mode 1**Temperature:** 19°C**Humidity:** 69% RH**Detector Function:** Quasi-peak.**Antenna:** Horizontal at 10m**Tested by:** Michael Chen**Test Results:** Pass

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

| Freq. (MHz) | Raw Data (dBuV) | Corr. Factor (dB/m) | Emiss. Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) |
|----------------|-----------------------|---------------------------|-----------------------------|--------------------|----------------|
| 45.79 | 13.6 | 12.0 | 25.6 | 40.0 | -14.4 |
| 85.04 | 16.4 | 9.6 | 26.0 | 40.0 | -14.0 |
| 117.75 | 11.6 | 15.4 | 27.0 | 40.0 | -13.0 |
| 176.65 | 12.5 | 14.3 | 26.8 | 40.0 | -13.2 |
| 183.40 | 12.8 | 14.5 | 27.3 | 40.0 | -12.7 |
| 228.99 | 13.5 | 14.3 | 27.8 | 40.0 | -12.2 |
| 458.00 | 10.8 | 22.7 | 33.5 | 47.0 | -13.5 |
| 576.87 | 9.5 | 24.8 | 34.3 | 47.0 | -12.7 |



7 POWER HARMONICS TEST

Port : AC mains

Basic Standard : EN 61000-3-2 (2000)

Limits : ☐ CLASS A ; ☐ CLASS B ; ☐ CLASS C ; ☒ CLASS D

Tested by : Michael Chen

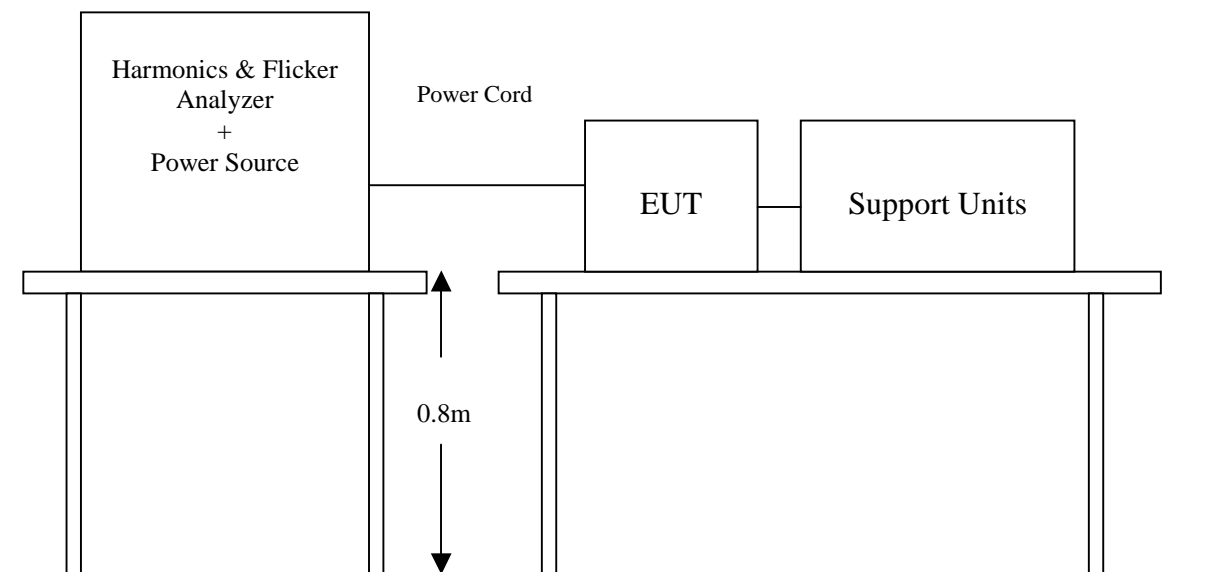
Temperature : 20°C

Humidity : 51% RH

Limit:

| Limits for Class A equipment | |
|------------------------------|--|
| Harmonics Order n | Max. permissible harmonics 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 | 0.15x15/n |
| Even harmonics | |
| 2 | 1.08 |
| 4 | 0.43 |
| 6 | 0.30 |
| 8<=n<=40 | 0.23x8/n |

| Limits for Class D equipment | | |
|------------------------------|---|--|
| Harmonics Order n | Max. permissible harmonics current per watt mA/W | Max. permissible harmonics current A |
| Odd Harmonics only | | |
| 3 | 3.4 | 2.30 |
| 5 | 1.9 | 1.14 |
| 7 | 1.0 | 0.77 |
| 9 | 0.5 | 0.40 |
| 11 | 0.35 | 0.33 |
| 13 | 0.30 | 0.21 |
| 15<=n<=39 | 3.85/n | 0.15x15/n |
| | | |
| | | |
| | | |
| | | |

Block Diagram of Test Setup:**Test Procedure:**

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- b. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

Test Result : (See Appendix II for details)

Note: According to clause 7 of EN 61000-3-2: 2000, equipment with a rated power of 75W or less, no limits apply. The test result is only for reference.

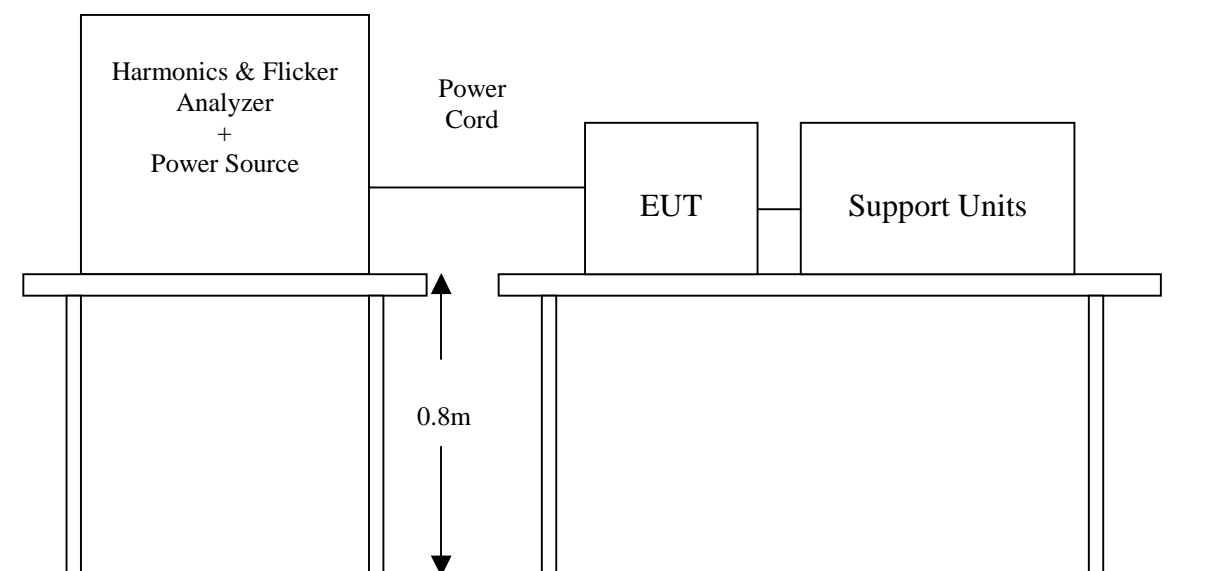
8 POWER VOLTAGE FLUCTUATION / FLICKER TEST

Port : AC mains
Basic Standard : EN 61000-3-3 (1995 + A1: 2001)
Limits : §5 of EN 61000-3-3
Tested by : Michael Chen
Temperature : 20°C
Humidity : 51% RH

Limit:

| TEST ITEM | LIMIT | REMARK |
|---------------|-------|--|
| P_{st} | 1.0 | P_{st} means short-term flicker indicator. |
| P_{lt} | 0.65 | P_{lt} means long-term flicker indicator. |
| T_{dt} (ms) | 500 | T_{dt} means maximum time that dt exceeds 3 %. |
| d_{max} (%) | 4% | d_{max} means maximum relative voltage change. |
| dc (%) | 3.3% | dc means relative steady-state voltage change |

Block Diagram of Test Setup:



Test Procedure:

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- b. During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

Test Result: (See Appendix II for details)

** Continue

| Test Parameter | Measurement Value | Limit | Result |
|----------------------|-------------------|-------|--------|
| P _{st} | 0.072 | 1.0 | Pass |
| P _{lt} | 0.072 | 0.65 | Pass |
| T _{dt} (ms) | 0 | 500 | Pass |
| d _{max} (%) | 0% | 4% | Pass |
| dc (%) | 0.01% | 3.3% | Pass |

** Manual Switch

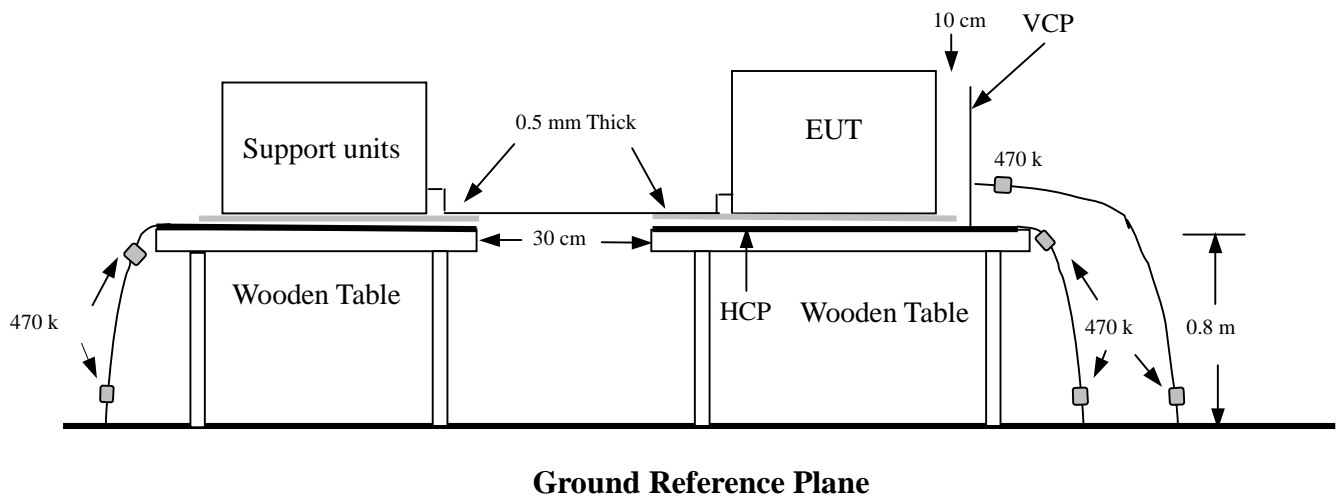
| Test Parameter | Measurement Value | Limit | Result |
|----------------------|-------------------|-------|--------|
| P _{st} | 0.072 | 1.0 | Pass |
| P _{lt} | 0.072 | 0.65 | Pass |
| T _{dt} (ms) | 0 | 500 | Pass |
| d _{max} (%) | 0.28% | 4% | Pass |
| dc (%) | 0.27% | 3.3% | Pass |

9 ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC/EN 61000-4-2
Test Level : ± 8 kV (Air Discharge)
 : ± 4 kV (Contact Discharge)
 : ± 4 kV (Indirect Discharge)
Performance Criterion : B (Standard Required)
Tested by : Michael Chen
Temperature : 20°C
Humidity : 50% RH
Pressure : 1013mbar

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 Windows XP mode.
4. The Host PC sent above message to EUT 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/EN 61000-4-2, 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 discharge | Voltage | Coupling | Result (Pass/Fail) |
|---------------------|---------|--------------------------------|--------------------|
| Mini 10 /Point | ± 8 kV | Air Discharge | Pass |
| Mini 25 /Point | ± 4 kV | Contact Discharge | Pass |
| Mini 25 /Point | ± 4 kV | Indirect Discharge HCP | Pass |
| Mini 25 /Point | ± 4 kV | Indirect Discharge VCP (Right) | **N/A |
| Mini 25 /Point | ± 4 kV | Indirect Discharge VCP (Left) | **N/A |
| Mini 25 /Point | ± 4 kV | Indirect Discharge VCP (Back) | **N/A |

****For the tested points to EUT, please refer to attached page.**

(Blue arrow mark for Contact Discharge and 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** ☐ **FAIL**

Observation: No function degraded during the tests.

The Tested Points of EUT

Photo 1 of 4



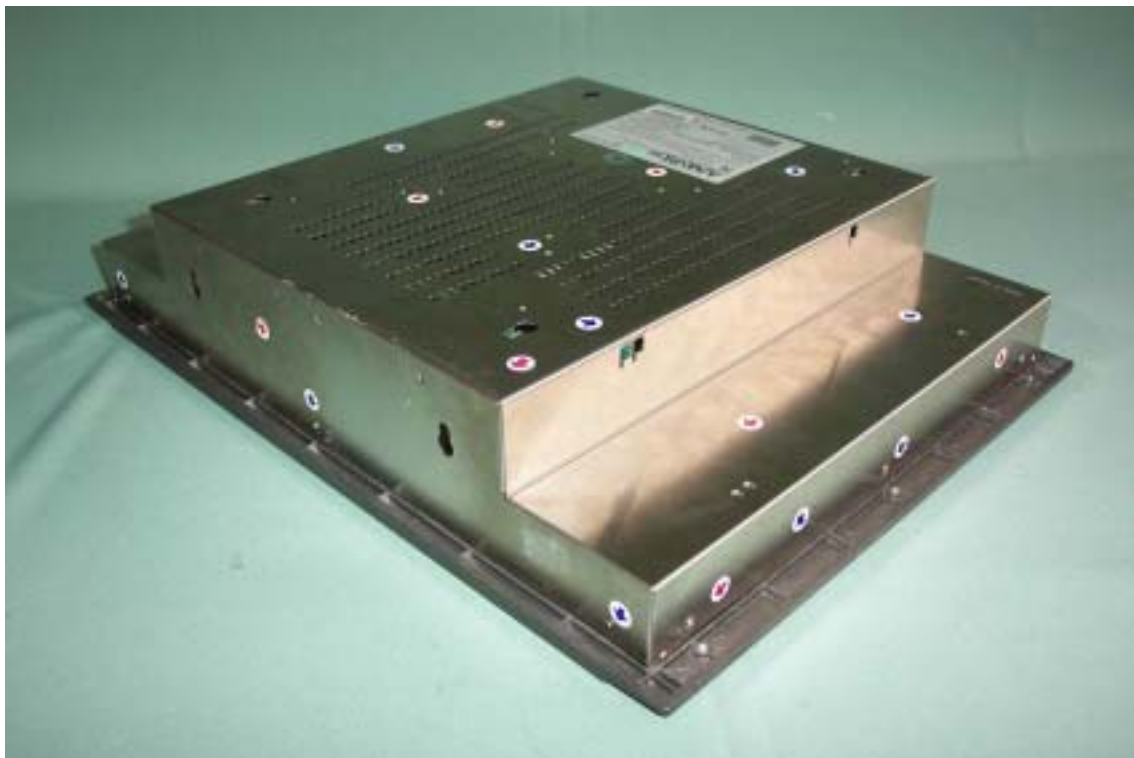
Photo 2 of 4



Photo 3 of 4



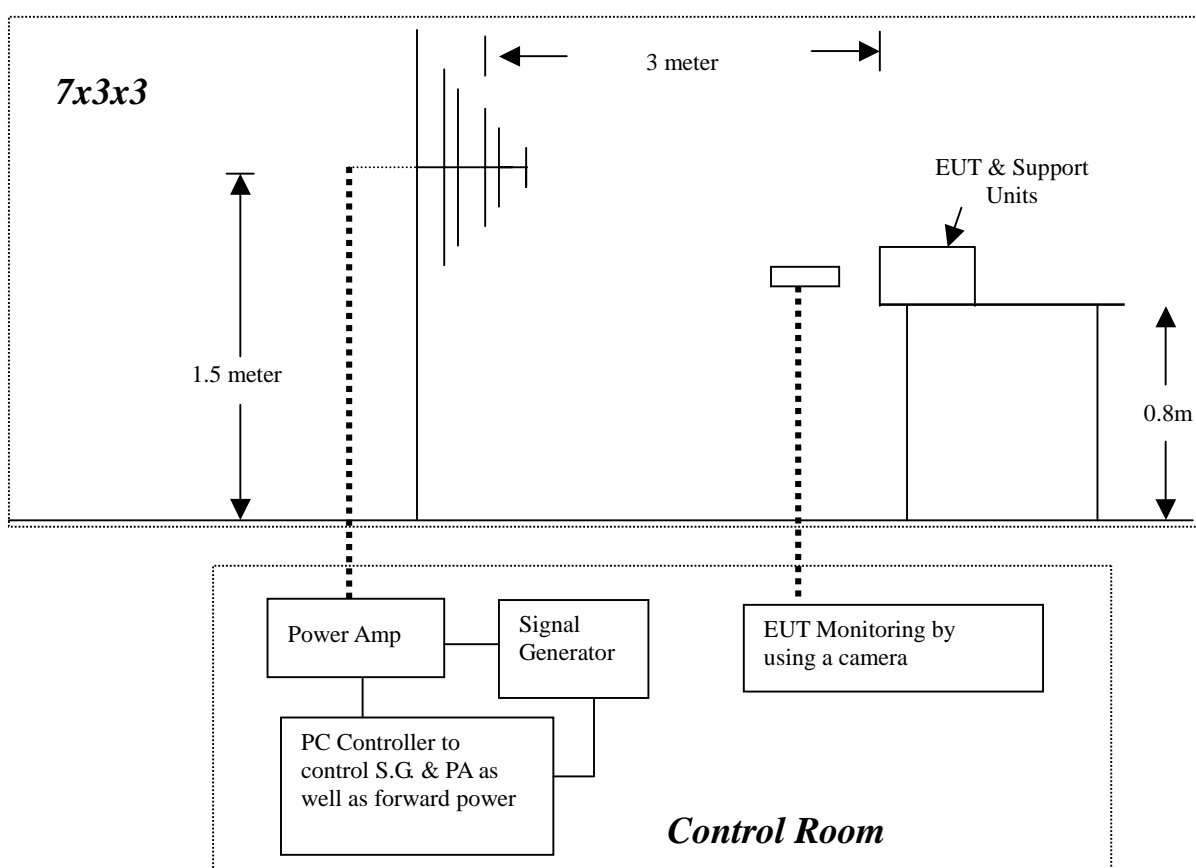
Photo 4 of 4



10 RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC/EN 61000-4-3
Requirements : 3 V/m / with 80% AM. 1kHz Modulation.
Performance Criterion : A (Standard Required)
Tested by : Michael Chen
Temperature : 19°C
Humidity : 60% RH
Pressure : 1015mbar

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/EN 61000-4-3.
2. Setting the testing parameters of RS test software per IEC/EN 61000-4-3.
3. Performing the pre-test at each side of with double specified level (6V/m) at 4% steps.
4. 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.
5. Recording the test result in following table.
6. It is not necessary to perform test as per annex A of EN 55024 if the EUT doesn't belong to ITE product.

Preliminary test conditions:

Test level : 6V/m
Steps : 4 % of fundamental
Dwell Time : 3 sec

| Range (MHz) | Field | Modulation | Polarity | Position | Result (Pass/Fail) |
|-------------|-------|------------|----------|----------|--------------------|
| 80-1000 | 6V/m | Yes | H | Front | Pass |
| 80-1000 | 6V/m | Yes | V | Front | Pass |
| 80-1000 | 6V/m | Yes | H | Right | Pass |
| 80-1000 | 6V/m | Yes | V | Right | Pass |
| 80-1000 | 6V/m | Yes | H | Back | Pass |
| 80-1000 | 6V/m | Yes | V | Back | Pass |
| 80-1000 | 6V/m | Yes | H | Left | Pass |
| 80-1000 | 6V/m | Yes | V | Left | Pass |

Final test conditions:

Test level : 3V/m
Steps : 1 % of fundamental
Dwell Time : 3 sec

| Range (MHz) | Field | Modulation | Polarity | Position | Result (Pass/Fail) |
|-------------|-------|------------|----------|----------|--------------------|
| 80-1000 | 3V/m | Yes | H | Front | Pass |
| 80-1000 | 3V/m | Yes | V | Front | 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.

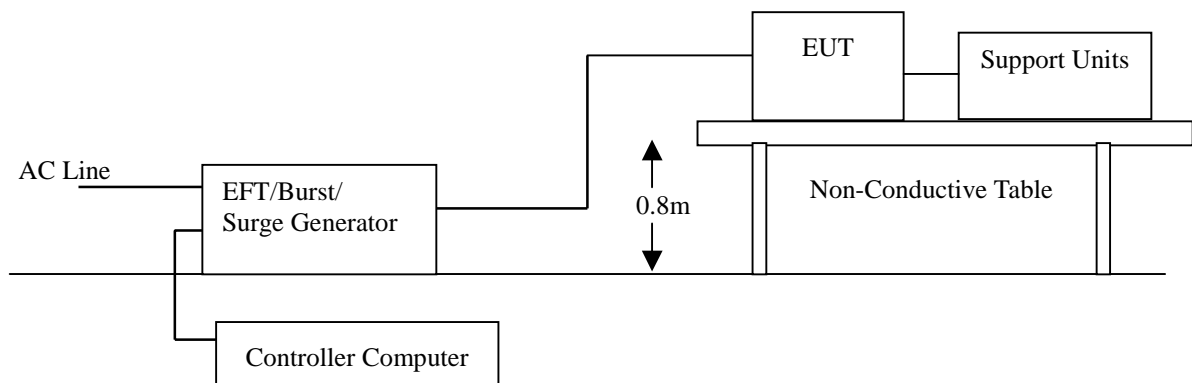
☒ **PASS** ☐ **FAIL**

Observation: No function degraded during the tests.

11 FAST TRANSIENTS/BURST IMMUNITY TEST

| | |
|-----------------------------|------------------------------------|
| Port | : On Power Supply Lines |
| Basic Standard | : IEC/EN 61000-4-4 |
| Requirements | : ± 1 kV for Power Supply Line |
| Performance Criteria | : B (Standard Required) |
| Tested by | : Michael Chen |
| Temperature | : 20°C |
| Humidity | : 51% RH |
| Pressure | : 1013mbar |

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 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. Injected test voltage to the EUT ports from minimum to standard request or client request.
5. 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) |
|-------------|------------|---------------|--------------------|
| L | ± 1 | Direct | Pass |
| N | ± 1 | Direct | Pass |
| PE | ± 1 | Direct | Pass |
| L + N | ± 1 | Direct | Pass |
| L + PE | ± 1 | Direct | Pass |
| N + PE | ± 1 | Direct | Pass |
| L + N + PE | ± 1 | Direct | 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** ☐ **FAIL**

Observation: No function degraded during the tests.

12 SURGE IMMUNITY TEST

Port : Power Cord

Basic Standard : IEC/EN 61000-4-5

Requirements : ± 1 kV (Line to Line)
 ± 2 kV (Line to Ground)

Performance Criteria : B (Standard Required)

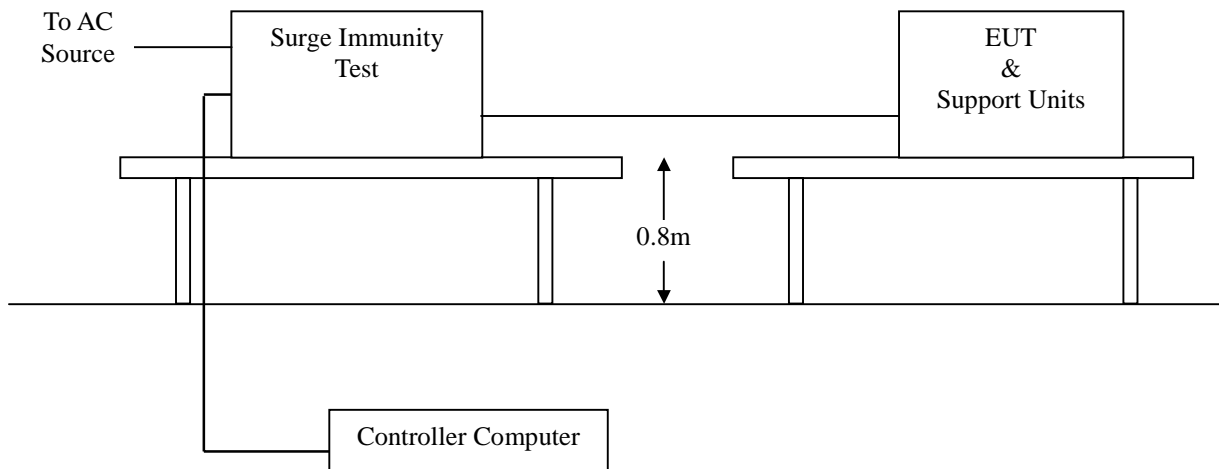
Tested by : Michael Chen

Temperature : 21°C

Humidity : 51% RH

Pressure : 1013mbar

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. Injected test voltage to the EUT ports from minimum to standard request or client request.
3. Recording the test result as shown in following table.

**Test conditions:**

Voltage Waveform : 1.2/50 μ s
Current Waveform : 8/20 μ s
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-PE | 2 | Positive | Capacitive | Pass |
| L2-PE | 2 | Positive | Capacitive | Pass |
| L1-L2 | 1 | Negative | Capacitive | Pass |
| L1-PE | 2 | Negative | Capacitive | Pass |
| L2-PE | 2 | 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.

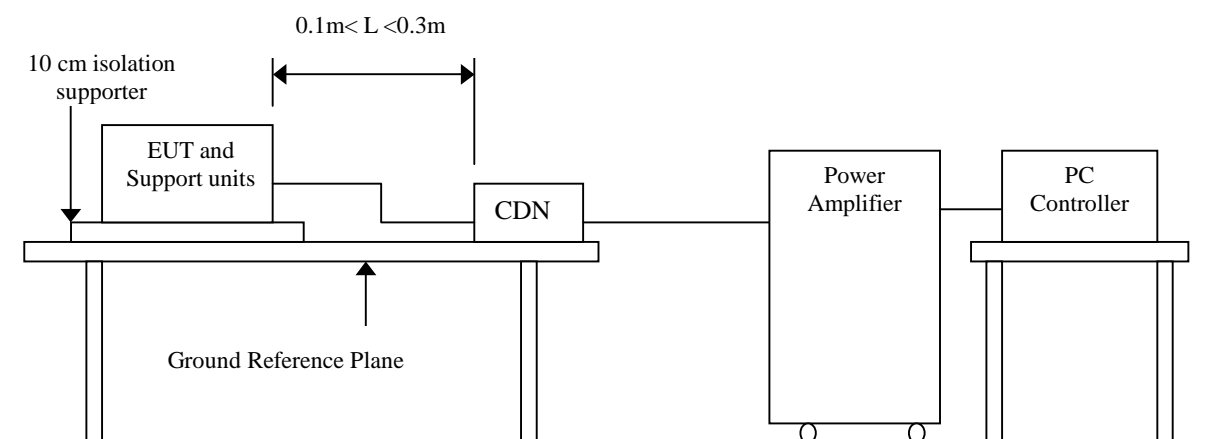
☒ **PASS** ☐ **FAIL**

Observation: No function degraded during the tests.

13 CONDUCTED DISTURBANCE/INDUCED RADIO-FREQUENCY FIELD IMMUNITY TEST

| | |
|------------------------------|-------------------------------------|
| Port | : AC Port |
| Basic Standard | : IEC/EN 61000-4-6 |
| Requirements | : 3 V with 80% AM. 1kHz Modulation. |
| Injection Method | : CDN-M3 for Power Cord |
| Performance Criterion | : A (Standard Required) |
| Tested by | : Michael Chen |
| Temperature | : 19°C |
| Humidity | : 60% RH |
| Pressure | : 1013mbar |

Block Diagram of Test Setup:



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. Setting the testing parameters of CS test software as per IEC/EN 61000-4-6.
3. 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 | 3V | 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** ☐ **FAIL****Observation:** No function degraded during the tests.

14 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

Port : Enclosure

Basic Standard : IEC/EN 61000-4-8

Requirements : 1 A/m

Performance Criterion : A (Standard Required)

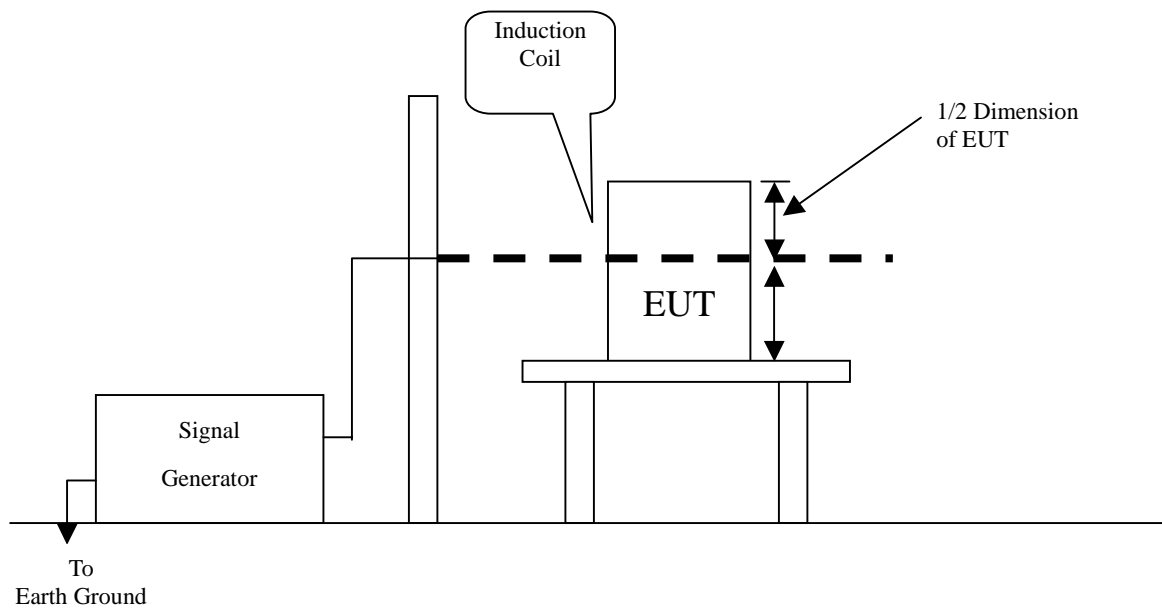
Tested by : Michael Chen

Temperature : 20°C

Humidity : 52% RH

Pressure : 1013mbar

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. Rotating the induction coil by 90° (Y direction)
4. Rotating the induction coil by 90° again (Z direction)
5. Recording the test result as shown in following table.

**Test conditions:**

Field Strength: 1A/m
Power Freq.: 50Hz
Orientation: X, Y, Z

| Orientation | Field | Result (Pass/Fail) | Remark |
|-------------|-------|--------------------|--------|
| X | 1A/m | Pass | |
| Y | 1A/m | Pass | |
| Z | 1A/m | 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** ☐ **FAIL**

Observation: No function degraded during the tests.

15 VOLTAGE DIPS / SHORT INTERRUPTIONS

Port : AC mains

Basic Standard : IEC/EN 61000-4-11

Requirement : PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

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

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

Test Interval : Min. 10 sec.

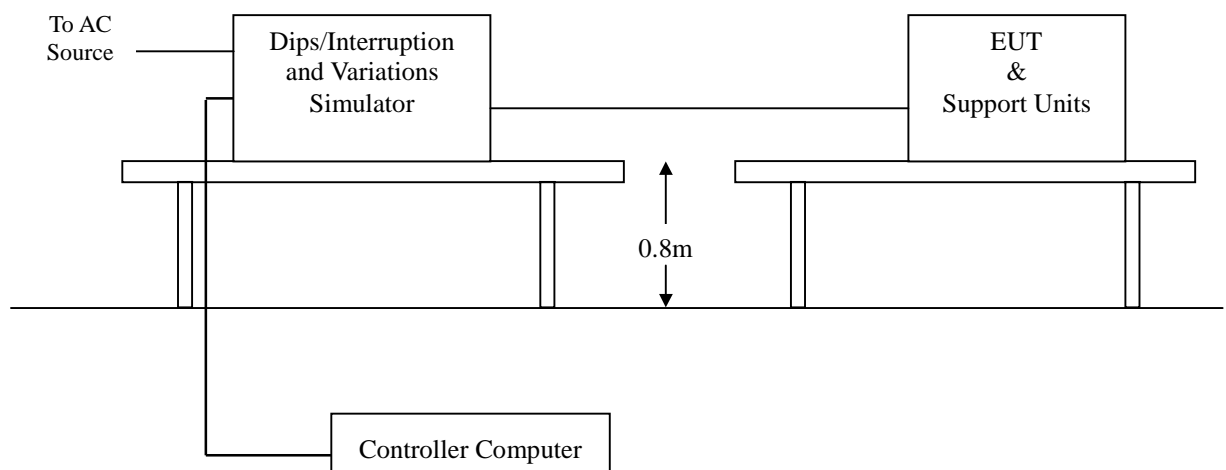
Tested by : Michael Chen

Temperature : 21°C

Humidity : 51% RH

Pressure : 1013mbar

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. 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.

**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 % U _T | Reduction (%) | Duration (periods) | Observation | Meet Performance Criteria |
|--------------------------------|------------------|-----------------------|-------------|---------------------------------|
| 0 | 100 | 0.5 | Normal | A |
| 70 | 30 | 25 | Normal | A |

Voltage Interruptions:

| Test Level % U _T | Reduction (%) | Duration (periods) | Observation | Meet Performance Criteria |
|--------------------------------|------------------|-----------------------|---|---------------------------------|
| 0 | 100 | 250 | EUT shut down, but can be auto recovered as the events disappear. | B |

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** ☐ **FAIL**

APPENDIX I - PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST (EN 55022)



RADIATED EMISSION TEST (EN 55022)



POWER HARMONIC & VOLTAGE FLUCTUATION / FLICKER TEST



ELECTROSTATIC DISCHARGE TEST



RADIATED ELECTROMAGNETIC FIELD TEST



FAST TRANSIENTS/BURST TEST



SURGE IMMUNITY TEST



CONDUCTED DISTURBANCE, INDUCED BY RADIO-FREQUENCY FIELDS TEST



POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST



VOLTAGE DIPS / INTERRUPTION TEST



**APPENDIX II – TEST RESULT OF EN 61000-3-2/-3****Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)**

Comply: IEC 61000-3-2 Ed.2.1 :2001 (incl. Amd.14) - IEC 61000-4-7 Ed.1.0 :1991

ADVANTECHHARCS Setup File : [unnamed](#)HARCS Report File : [unnamed](#)

Operator :

Michael Chen

EUT :

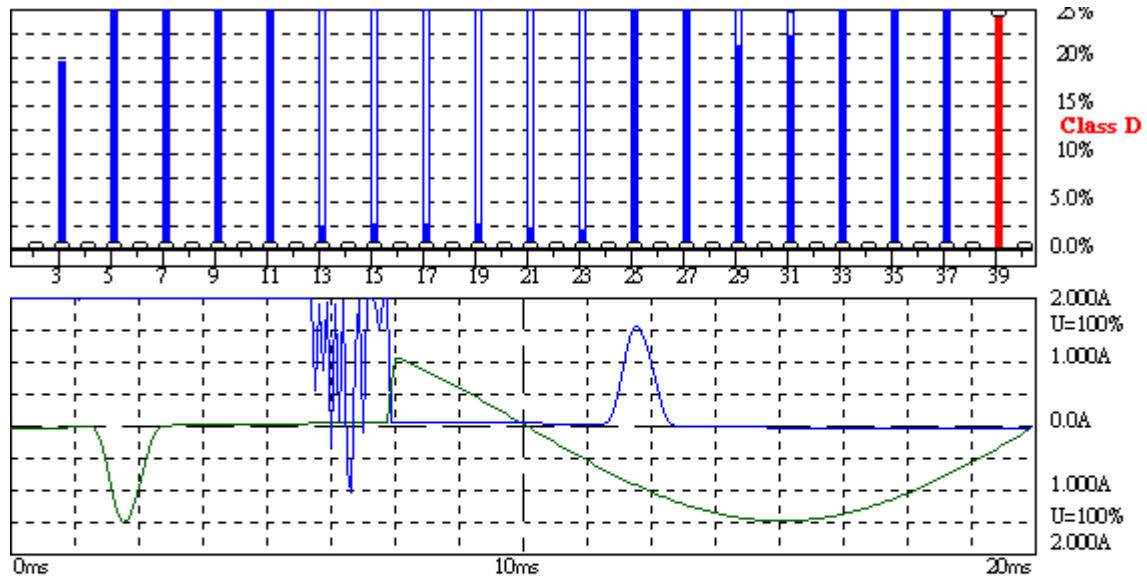
LCD MONITOR

Model No.

FPM-3150TVE-T

Remarks

TEMP:20 HUMD:51

**Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2)**

2004/3/4 PM 09:36:24

| | | | | | | | | | | |
|--------------------|-------|---|------|-----|---|--------------------|-------|---|--------------------|------------|
| U _{rms} = | 230.1 | V | P = | OFL | W | THC = | 1.184 | A | Range: | 2 A |
| I _{rms} = | OFL | A | pf = | — | | P _{max} = | 209.0 | W | V _{nom} : | 230 V |
| | | | | | | | | | TestTime: | 5 min (0%) |

LCD MONITOR

Test aborted, Result: FAILED

TEMP:20 HUMD:51

B4R-1000 EMC-Print

Full Bar : Actual Values

Empty Bar : Maximum Values

Blue : Current , Green : Voltage , Red : Failed

Measurement

ADVANTECH

Date : 2004/3/4 PM 09:34:07 V3.15

File :

Operator :

Michael Chen

EUT :

LCD MONITOR

Model No.

FPM-3150TVE-T

Remarks

TEMP:20 HUMD:51



Urms = 230.1V Freq = 49.987 Range: 2 A
Irms = 0.341A IpK = 1.565A cf = 4.593
P = 33.48W Pap = 78.43VA pf = 0.427
THDi = 90.2 % THDu = 0.10 % Class D

Test - Time : 5min (100 %)

Limit Reference: Pmax = 33.574W

Test completed, Result: FAILED

| Order | Freq. [Hz] | Imax [A] | Imax% [%] | Imax%L [%] | Limit [A] | Status |
|-------|---------------|-------------|--------------|---------------|--------------|--------|
| 1 | 50 | 0.1523 | 44.699 | | | |
| 2 | 100 | 0.0023 | 0.6805 | | | |
| 3 | 150 | 0.1371 | 40.222 | 120.09 | 0.1142 | Fail |
| 4 | 200 | 0.0022 | 0.6447 | | | |
| 5 | 250 | 0.1344 | 39.434 | 210.69 | 0.0638 | Fail |
| 6 | 300 | 0.0021 | 0.6089 | | | |
| 7 | 350 | 0.1252 | 36.748 | 373.04 | 0.0336 | Fail |
| 8 | 400 | 0.0020 | 0.5731 | | | |
| 9 | 450 | 0.1158 | 33.990 | 690.08 | 0.0168 | Fail |
| 10 | 500 | 0.0018 | 0.5372 | | | |
| 11 | 550 | 0.1035 | 30.372 | 880.91 | 0.0118 | Fail |
| 12 | 600 | 0.0017 | 0.5014 | | | |
| 13 | 650 | 0.0906 | 26.576 | 910.94 | 0.0099 | Fail |
| 14 | 700 | 0.0015 | 0.4298 | | | |
| 15 | 750 | 0.0770 | 22.600 | 893.85 | 0.0086 | Fail |
| 16 | 800 | 0.0013 | 0.3940 | | | |
| 17 | 850 | 0.0631 | 18.517 | 830.01 | 0.0076 | Fail |
| 18 | 900 | 0.0011 | 0.3223 | | | |
| 19 | 950 | 0.0503 | 14.756 | 739.26 | 0.0068 | Fail |
| 20 | 1000 | 0.0010 | 0.2865 | | | |
| 21 | 1050 | 0.0377 | 11.067 | 612.80 | 0.0062 | Fail |
| 22 | 1100 | 0.0006 | 0.1791 | | | |
| 23 | 1150 | 0.0275 | 8.0587 | 488.71 | 0.0056 | Fail |
| 24 | 1200 | 0.0006 | 0.1791 | | | |
| 25 | 1250 | 0.0181 | 5.3009 | 349.42 | 0.0052 | Fail |
| 26 | 1300 | 0.0004 | 0.1074 | | | |
| 27 | 1350 | 0.0115 | 3.3668 | 239.68 | 0.0048 | Fail |
| 28 | 1400 | 0.0004 | 0.1074 | | | |
| 29 | 1450 | 0.0071 | 2.0774 | 158.84 | 0.0045 | Fail |
| 30 | 1500 | 0.0002 | 0.0716 | | | |
| 31 | 1550 | 0.0062 | 1.8266 | 149.31 | 0.0042 | Fail |
| 32 | 1600 | 0.0002 | 0.0716 | | | |
| 33 | 1650 | 0.0071 | 2.0774 | 180.75 | 0.0039 | Fail |
| 34 | 1700 | 0.0001 | 0.0358 | | | |
| 35 | 1750 | 0.0071 | 2.0774 | 191.71 | 0.0037 | Fail |
| 36 | 1800 | 0.0001 | 0.0358 | | | |
| 37 | 1850 | 0.0070 | 2.0415 | 199.17 | 0.0035 | Fail |
| 38 | 1900 | 0.0001 | 0.0358 | | | |
| 39 | 1950 | 0.0057 | 1.6834 | 173.10 | 0.0033 | Fail |
| 40 | 2000 | 0.0000 | 0.0000 | | | |

Important:

Pmax is below 75W. This seems not to be a class D equipment.



ADVANTECH

Date : 2004/3/4 PM 09:51:24 V3.15

File :

Operator : Michael Chen
EUT : LCD MONITOR
Model No. FPM-3150TVE-T
Remarks TEMP:20 HUMD:51

Urms = 230.1V Freq = 49.987 Range: 2 A
Irms = 0.344A Ipk = 1.606A cf = 4.673
P = 33.33W Pap = 79.10VA pf = 0.421

Test - Time : 1 x 10min = 10min (100 %)

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.30 %
dtLim: 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

Plt = 0.072

| | Pst | dmax | dc | dt>Lim | Fail |
|---|-------|-------|-------|--------|------|
| | | [%] | [%] | [ms] | |
| 1 | 0.072 | 0.000 | 0.010 | 0.000 | |



ADVANTECH

Date : 2004/3/4 PM 10:04:54 V3.15

File :

Operator : Michael Chen
EUT : LCD MONITOR
Model No. FPM-3150TVE-T
Remarks TEMP:20 HUMD:51 (MANUALSWITCH)

Urms = 230.1V Freq = 49.987 Range: 2 A
Irms = 0.342A Ipk = 1.616A cf = 4.729
P = 33.03W Pap = 78.65VA pf = 0.420

Test - Time : 1 x 10min = 10min (100 %)

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.30 %
dtLim: 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

Plt = 0.072

| | Pst | dmax | dc | dt>Lim | Fail |
|---|-------|-------|-------|--------|------|
| | | [%] | [%] | [ms] | |
| 1 | 0.072 | 0.280 | 0.270 | 0.000 | |