



EMC COMPLIANCE TEST REPORT

for

IPC

Trade Name : Advantech
Model Number : PWS-14X9TX-XX
("X" see as page 8)
Serial Number : N/A
Report Number : 021245-E
Date : December 3, 2002
Regulations : See below

| Standards | Results (Pass/Fail) |
|--|---------------------|
| EN 55022: 1998 (Class A) | PASS |
| EN 55011:1998 (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 |

Prepared for:

Advantech Co.

**No. 1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, R.O.C.**

Prepared by:

C&C LABORATORY, CO., LTD.

#B1, 1st Fl., Universal Center,

No. 183, Sec. 1, Tatung Rd., Hsi Chih,

Taipei Hsien, Taiwan, R.O.C.

TEL: (02)8642-2071~3

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C&C Laboratory Co., Ltd.**

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VERIFICATION OF COMPLIANCE

Equipment Under Test: IPC
Trade Name: Advantech
Model Number: PWS-14X9TX-XX ("X" see as page 8)
Serial Number: N/A
Applicant: Advantech Co.
No. 1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, R.O.C.

Manufacturer: Advantech Co.
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: 1998 (Class A)
EN 55011:1998 (Group 1, Class A)
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998
EN 61000-3-3: 1995
EN 55024: 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: 021245-E
Date of test: November 21 ~ 30, 2002
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 (Mi C) | Remark |
|--------------------|-------------|---------------|-------------------------|--------|
| Radiated Emission | 38.92 | 35.9 (dB/m) | -4.1dB (± 2.34 dB) | |
| Conducted Emission | 10.000 | 79.00 (dB) | -8.0dB (± 1.66 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.

Approved by Authorized Signatory: _____

Susan Su for

Lucky Chen/ EMC Director



GENERAL INFORMATION

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

Contact Person: John Chou

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

File Number: 021245-E

Date of Test: November 21 ~ 30, 2002

Equipment Under Test: IPC

Model Number: PWS-14X9TX-XX (“X” see as page 8)

Serial Number: N/A

Type of Test: EMC Directive 89/336/EEC for CE Marking

Technical Standards: EN 55022: 1998 (Class A)
EN 55011:1998 (Group 1, Class A)
EN 61000-3-2: 1995 + A1: 1998 + A2: 1998
EN 61000-3-3: 1995
EN 55024: 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)

**Frequency Range
(EN 55022):** 150kHz to 30MHz for Line Conducted Test
30MHz to 1000MHz for Radiated Emission Test

Test Site C&C LABORATORY CO., LTD.
No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang,
Taoyuan, Taiwan, R. O. C.



SYSTEM DESCRIPTION

EUT Test Procedure:

1. An EMI test software was loaded and executed Windows mode.
2. A communicated software was loaded and executed to communicate between EUT and equipment.
3. EUT sends and receives data from Notebook PC on remote side via LAN cable.
4. Data was sent to LCD Panel of EUT filling the screen with upper case of “H” patterns.
5. Test program sequentially exercised all related I/O’s of EUT and sent “H” patterns to all applicable output ports of EUT.
6. Repeat 3 to 5. Test program is self-repeating throughout the test.



PRODUCT INFORMATION

| | | |
|-----------------------------------|-------------------------------|--------------------------------------|
| Housing Type: | Metal case | |
| EUT Power Rating: | DCV form Power Supply | |
| AC Power during Test | 230VAC/50Hz to Power Supply | |
| Power Supply Manufacturer: | ZIPPY | |
| Power Supply Model Number: | PIG-6300P | |
| AC Power Cord Type: | Unshielded, 1.8m (Detachable) | |
| CPU Manufacture: | Intel | Type: PIII 850MHz |
| OSC/Clock Frequencies: | 100MHz | |
| Memory Capacity: | | Install: 64MB |
| LCD Panel Manufacturer: | NEC | Model: NL10276AC28-05R |
| HDD Manufacturer: | Quantum | Model: QMP20000AS-A |
| FDD Manufacturer: | Panasonic | Model: JU-226A |
| CD-ROM Manufacturer: | Quanta | Model: SCR-242 |
| Chassis Manufacturer: | Storage | Model: PWS-1419 PWS-1409 |
| Backplane Manufacturer: | Advantech | Model: PCA-6109P4 PCA-6109 |
| LAN Card: | On Board | |



I/O Port of EUT:

| I/O PORT TYPES | Q' TY | TESTED WITH |
|-----------------------|--------------|--------------------|
| 1). Parallel Port | 1 | 1 |
| 2). Serial Port | 2 | 2 |
| 3). LAN Port | 1 | 1 |
| 4). USB Port | 4 | 4 |

Note:

- The means of "X" on model number is list as below:
 - The first "X" = Type of Chassis (0 : Aluminum Chassis with ABS Plastic Shell)
(1 : Aluminum Chassis)
 - The second "X" = Type of Backplane (Null : PCA-6109 ISA Bus*9 Slot Backplane)
(P : PCA-6109P4 4PCI+ 4ISA+ 1CPU Slot)
 - The last "XX" = Type of CPU Card Model (C1 : PCA-6180E)
- Client consigns only one model samples to tested. (Model Number: PWS-1419TP-C1)
Therefore, the testing Lab. just guarantees the unite, which have been tested.



SUPPORT EQUIPMENT

| No | Equipment | Model # | Serial # | FCC ID | Trade Name | Data Cable | Power Cord |
|----|-------------------------|--------------------------|--------------|--------------|------------|-------------------------------|---|
| 1. | Modem | 231AA | A08431083982 | BFJ9D93108US | Hayes | Shielded, 1.8m | Unshielded, 1.8m |
| 2. | Printer | EPSON STYLUS C20SX | DW4E126664 | FCC DoC | EPSON | Shielded, 1.8m | Unshielded, 1.8m |
| 3. | Mouse | M-HH43 | LZE93352988 | FCC DoC | Logitech | Shielded, 1.8m | N/A |
| 4. | USB Mouse | M-BB48 | LZE92250259 | FCC DoC | Logitech | Shielded, 1.8m | N/A |
| 5. | USB Mouse | M-BB48 | LZE94150675 | FCC DoC | Logitech | Shielded, 1.8m | N/A |
| 6. | USB Mouse | M-BB48 | LZE01450904 | FCC DoC | Logitech | Shielded, 1.8m | N/A |
| 7. | USB Mouse | M-BB48 | LZE01361333 | FCC DoC | Logitech | Shielded, 1.8m | N/A |
| 8. | HUB (Remote) | UP 206 | 100825 | N/A | PRO-COMM | LAN Cable: Unshielded, 20m | Unshielded, 1.8m |
| 9. | Notebook PC (Remote) | M285 | NU2503589 | FCC DoC | LEO | Unshielded, 1.5m | AC I/P: Unshielded, 1.8m 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.



TEST FACILITY

- Location:** No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R. O. C.
- Description:** There are four 3/10m open area test sites and three line conducted labs for final test.
The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 16 requirements.
- Site Filing:** A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.

Registration also was made with Voluntary Control Council for Interference (VCCI).
- Site Accreditation:** Accredited by NEMKO (Authorization #: ELA 124) for EMC & A2LA (Certificate #: 824.01) for Emission

Also accredited by BSMI for the product category of Information Technology Equipment.
- Instrument Tolerance:** All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.
- Ground Plane:** Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

Site # 3 & # 4 Line Conducted Test Site: At Shielding Room



THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

C & C LABORATORY CO., LTD
Hsi Chin, Taipei Hsien, Taiwan, R.O.C

for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing. Testing and calibration laboratories that comply with this International Standard also operate in accordance with ISO 9001 or ISO 9002 (1994).

Presented this 30th day of January, 2002.



Peter R. Meyer
President
For the Accreditation Council
Certificate Number 824-01
Valid to January 31, 2004

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation



American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

C & C LABORATORY CO., LTD.
No. E1-1, Lane 210, Pa-De 2nd Rd.,
Lu Chu Hsiang, Tainan, TAIWAN, R.O.C.
Kuen Chen Phone: 002 885 7 324 0332
Fax: 002 885 7 324 5235

ELECTRICAL (EMC)

Valid to: January 31, 2004

Certificate Number: 0824-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

Test Technology

Test Methods

Emissions

Radiated & Conducted

CFR 47, FCC Part 15/18 using ANSI C63.4/1992&2000;
AS/NZS 3548; VCCI V3 (2001); CNS 13438;
CNS 13439; CNS 13783; CNS 13803; CNS 14135;
CISPR 11; EN 55011; CISPR 14-1; EN 55014-1;
CISPR 15; EN 55015; CISPR 22; EN 55022;
EN 50081-1/ EN 61000-6-3: 2001;
EN 50082-1/ EN 61000-6-4: 2001

Immunity

Electrostatic Discharge (ESD)
Radiated Immunity
Electrical Fast Transient/Burst
Surge Immunity
Conducted Immunity
Power Frequency Magnetic
Field Immunity
Voltage Dips, Short Interruptions, and
Low Voltage Variations
Harmonics/Flicker

IEC/EN 61000-4-2; IEC 801-2
IEC/EN 61000-4-3; IEC 801-3
IEC/EN 61000-4-4; IEC 801-4
IEC/EN 61000-4-5
IEC/EN 61000-4-8
IEC/EN 61000-4-11
IEC/EN 61000-3-2; IEC/EN 61000-3-3

¹ Note: This accreditation covers testing performed at the main laboratory listed above, and the satellite laboratory located at No.199, Chung Sheng Road, Hsin Tien City, Taipei, TAIWAN, R.O.C.

(A2LA Cert. No. 0824.01) 01/30/02

Page 1 of 2

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8375 • Phone: 301-644 3248 • Fax: 301-662 2974

Product Immunity / Generic Immunity

ITE Product
Home Appliances
Residential, commercial and light
Industry
Industry

CISPR 24; EN 55024
CISPR 14-2; EN 55014-2
EN 50081-2/ EN 61000-6-1: 2001
EN 50082-2/ EN 61000-6-2: 2001

On the following products/equipment:

Computer Components and Peripherals; Networking Components; Wireless Communications
Components; Electronic Components; Televisions; Home Appliances

01/25/02

Peter R. Meyer

(A2LA Cert. No. 0824.01) 01/30/02

Page 2 of 2



FEDERAL COMMUNICATIONS COMMISSION
Laboratory Division
7435 Oakland Mills Road
Columbia, MD, 21046

March 06, 2002

Registration Number: 93105

C & C Laboratory Co., Ltd.
No. 81-1, 210 Lane,
Po-de 2nd Road, Lu-Chu Hsiang
Taoyuan
Taiwan
Attention: Kurt Chen

Re: Measurement facility located at Taoyuan
Site No. 4 (3 & 10 meters)
Date of Listing: March 06, 2002

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,

Thomas W Phillips
Electronics Engineer

FEDERAL COMMUNICATIONS COMMISSION
Laboratory Division
7435 Oakland Mills Road
Columbia, MD, 21046

February 27, 2001

Registration Number: 99471

C & C Laboratory Co., Ltd.
No. 101, 1st Fl., No. 185, Sec. 1
Tungshu Rd., No. 718
Taichung
Taiwan, R.O.C.
Attention: Kurt Chen

Re: Measurement facility located at Taoyuan
Site No. 1 & 3 (3 & 10 meters)
Date of Listing: February 27, 2001

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,

Thomas W Phillips
Electronics Engineer

COMMERCE
MINISTRY OF COMMERCE
To Monitor Tsushikake

ENG 319
AJD

22 January 1998

C & C Laboratory Co Ltd
1* R
No. 344
Fu Ching Street
Taipei
TAIWAN ROC

Attention: Mr Tony Hsiung

Dear Sir

LABORATORY APPROVAL

Thank you for your submission of 21 January regarding the approval of your testing laboratory to the Ministry of Commerce's laboratory approval criteria. Thank you for your interest in this matter.

I am pleased to advise that your submission has been successful and your laboratory has been added to the list of Ministry-approved laboratories. Your approved status is valid until 31 December 1998. At this time, the Approved Laboratory scheme will cease operation with the implementation of the new telecommunications regulations. Test reports from your laboratory will be accepted under the new framework. Please find enclosed a copy of the Ministry's discussion paper, DP10, outlining the proposed compliance process from 1 January 1999.

If you have any further questions on this matter please do not hesitate to contact me.

Yours faithfully

Andrew Dyko
Senior Technical Officer(Regulatory)

Operations and Risk Management Branch, Ministry of Commerce 18 E Ring, 25 Area 5 Street, 9th Floor, New Zealand.
PO Box 2477, Auckland (09) 472 0939, Fax (09) 472 7466

COMMERCE
MINISTRY OF COMMERCE
To Monitor Tsushikake

ENG 319
AJD

22 January 1998

C & C Laboratory Co Ltd
1* R
No. 344
Fu Ching Street
Taipei
TAIWAN ROC

Attention: Mr Tony Hsiung

Dear Sir

LABORATORY APPROVAL

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If you have any further questions on this matter please do not hesitate to contact me.

Yours faithfully

Andrew Dyko
Senior Technical Officer(Regulatory)

Operations and Risk Management Branch, Ministry of Commerce 18 E Ring, 25 Area 5 Street, 9th Floor, New Zealand.
PO Box 2477, Auckland (09) 472 0939, Fax (09) 472 7466



World-wide Testing and Certification

ELA 4RTTE

EMC Laboratory Authorisation

Aut. No. : ELA 192

Testing of

Radio & Telecommunications Terminal Equipment

EMC Laboratory: C & C Laboratory Co., Ltd.
No. 15, 14 Lin, Chin Twa Chi, Lu Chu Hsiang,
Taoyuan 338, Taiwan R.O.C.

Scope of Authorisation: All CENELEC and ETSI standards [ENs and ETSs that are listed on the accompanying page, and, all of the corresponding CISPR, IEC, and ISO EMC standards]. This authorisation covers all of the EMC-related testing and documentation within the scope of the *Radio and Telecommunications Terminal Equipment (R&TTE) Directive (No. 1998/5/EC)*.

NOTE: This authorisation also covers EMC-related testing and documentation that is within the scope of Article 10.5 of the *EMC Directive (No. 89/336/EEC as amended by 92/31/EEC)*.

This Authorisation Document confirms that the above mentioned EMC Laboratory has been validated against EN 45001 and found to be compliant. The laboratory also fulfills the conditions described in Nemko Document ELA 10. During Nemko's visit to the laboratory, an assessment was made of the relevant parts of your organisation - i.e. facilities, personnel qualifications, test equipment, and testing practices. It was found that the EMC Laboratory is capable of performing tests within the Scope of Authorisation given on the accompanying page. Accordingly, Nemko will accept your test reports as a basis for attesting conformity to these EMC Standards for the products in question under the European Union's Directive specified above.

For Type Examination Certification(s) to be issued by Nemko, your EMC Laboratory's test reports will be accepted by Nemko if they are enclosed with the Application Form submitted by the manufacturer.

In order to maintain this Authorisation, the information given in the enclosed ELA-ENPs (if any) must be carefully followed. Nemko is to be promptly notified about any changes in the situation at your EMC Laboratory which may affect the basis for this Authorisation. The Authorisation may at any time be withdrawn if the conditions are no longer considered to be fulfilled.

The Authorisation is valid through 31. December 2003.

Oslo 26 April 2001

For Nemko AS:

Kjell Bergh

Kjell Bergh, Nemko Group EMC Co-ordinator

Printed address: P.O. Box 110, Slottet,
N-2007 Oslo, NORWAY
Telephone: +47 22 96 90 00
Fax: +47 22 96 90 00



World-wide Testing and Certification

ELA 4RTTE

EMC Laboratory Authorisation

Aut. No. : ELA 192

(Page 2 of 2)

SCOPE OF AUTHORISATION

Generic and product-family standards, R&TTE

| | | |
|--|--|--------------------|
| EN 300 328-1:1997 + A1:97 EN 300 328-2:2000 | EN 300 343-1:1997 EN 301 488-07:2000 | EN 300 488-08:2000 |
| EN 300 422-2:2000 | EN 300 445-17:1998 + A1:97 EN 301 488-08:2000 | EN 300 488-08:2000 |
| EN 300 860:1997 EN 301 488-03:2000 | EN 300 860:1997 EN 301 488-17:2000 | EN 300 860:1997 |
| EN 301 425-2:1999 | EN 301 425-2:2000 | EN 301 425-2:2000 |
| EN 301 488-01:2000 | | |

Basic standards

| | | |
|--|--|--|
| EN 55002-4-2:1995 + A1:96 EN 55002-4-2:1995 + A1:96 | EN 55002-4-2:1995 + A1:96 EN 55002-4-2:1995 + A1:96 | EN 55002-4-2:1995 EN 55002-4-2:1995 |
| EN 55002-4-2:1995 EN 55002-4-2:1995 | EN 55002-4-2:1995 EN 55002-4-2:1995 | EN 55002-4-2:1995 EN 55002-4-2:1995 |
| EN 55002-4-2:1995 EN 55002-4-2:1995 | EN 55002-4-2:1995 EN 55002-4-2:1995 | EN 55002-4-2:1995 EN 55002-4-2:1995 |
| EN 55002-4-2:1995 EN 55002-4-2:1995 | EN 55002-4-2:1995 EN 55002-4-2:1995 | EN 55002-4-2:1995 EN 55002-4-2:1995 |

Oslo 26 April 2001

Kjell Bergh, Nemko Group EMC Co-ordinator

Printed address: P.O. Box 110, Slottet,
N-2007 Oslo, NORWAY
Telephone: +47 22 96 90 00
Fax: +47 22 96 90 00



World-wide Testing and Certification

ELA 4

EMC Laboratory Authorisation

Aut. No. : ELA 124

EMC Laboratory: C & C Laboratory Co., Ltd.
No. 15, 14 Lin, Chin Twa Chi, Lu Chu Hsiang,
Taoyuan 338, Taiwan R.O.C.

Scope of Authorisation: All CENELEC standards [ENs] for EMC that are listed on the accompanying page, and, all of the corresponding CISPR, IEC, and ISO EMC standards that are listed on the accompanying page.

This Authorisation Document confirms that the above mentioned EMC Laboratory has been validated against EN 45001 and found to be compliant. The laboratory also fulfills the conditions described in Nemko Document ELA 10. During Nemko's visit to the laboratory an assessment was made of the relevant parts of your organisation - i.e. facilities, personnel qualifications, test equipment, and testing practices. It was found that the EMC Laboratory is capable of performing tests within the Scope of Authorisation given on the accompanying page. Accordingly, Nemko will accept your test reports as a basis for attesting conformity to these EMC Standards for the products in question under the European Union EMC Directive [89/336/EEC as amended by 92/31/EEC and 98/1/EEC].

In case of applications for Product Certification(s) to be issued by Nemko, your EMC Laboratory's test report(s) will be accepted by Nemko if they are enclosed with the Application Form submitted by the manufacturer.

In order to maintain this Authorisation, the information given in the enclosed ELA-ENPs (if any) must be carefully followed. Nemko is to be promptly notified about any changes in the situation at your EMC Laboratory, which may affect the basis for this Authorisation. The Authorisation may at any time be withdrawn if the conditions are no longer considered to be fulfilled.

The Authorisation is valid through 31. December 2003.

Oslo 26 April 2001

For Nemko AS:

Kjell Bergh

Kjell Bergh, Nemko Group EMC Co-ordinator

Printed address: P.O. Box 110, Slottet,
N-2007 Oslo, NORWAY
Telephone: +47 22 96 90 00
Fax: +47 22 96 90 00



World-wide Testing and Certification

ELA 4

EMC Laboratory Authorisation

Aut. No. : ELA 160

EMC Laboratory: C & C Laboratory Co., Ltd.
No. 15, 14 Lin, Chin Twa Chi, Lu Chu Hsiang,
Taoyuan 338, Taiwan R.O.C.

Scope of Authorisation: EN 60601-1-2 and IEC 60601-1-2, the Collateral Standards for electro-medical products, with particular application to EMC requirements only.

This Authorisation Document confirms that the above mentioned EMC Laboratory has been validated against EN 45001 and found to be compliant. The laboratory also fulfills the conditions described in Nemko Document ELA 10. During Nemko's visit to the laboratory an assessment was made of the relevant parts of your organisation - i.e. facilities, personnel qualifications, test equipment, and testing practices. It was found that the EMC Laboratory is capable of performing tests within the Scope of Authorisation listed above. Accordingly, Nemko will accept your test reports as a basis for attesting conformity to these EMC Standards for the products in question under either the European Union Medical Device Directive [MDD], 90/269/EEC, or the European Union Active Implantable Medical Device Directive [AIMD], 90/285/EEC, (as applicable).

In case of applications for Product Certification(s) to be issued by Nemko, your EMC Laboratory's test report(s) will be accepted by Nemko if they are enclosed with the Application Form submitted by the manufacturer.

In order to maintain this Authorisation, the information given in the enclosed ELA-ENPs (if any) must be carefully followed. Nemko is to be promptly notified about any changes in the situation at your EMC Laboratory which may affect the basis for this Authorisation. The Authorisation may at any time be withdrawn if the conditions are no longer considered to be fulfilled.

The Authorisation is valid through 31. December 2003.

Oslo 26 April 2001

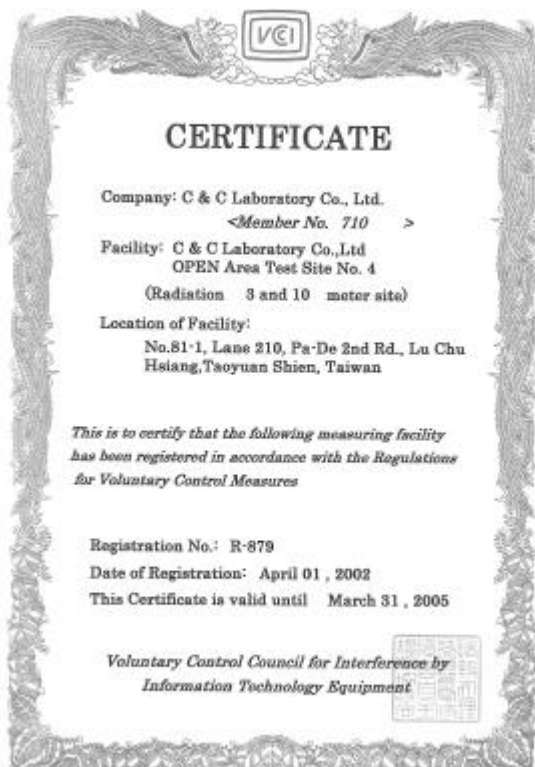
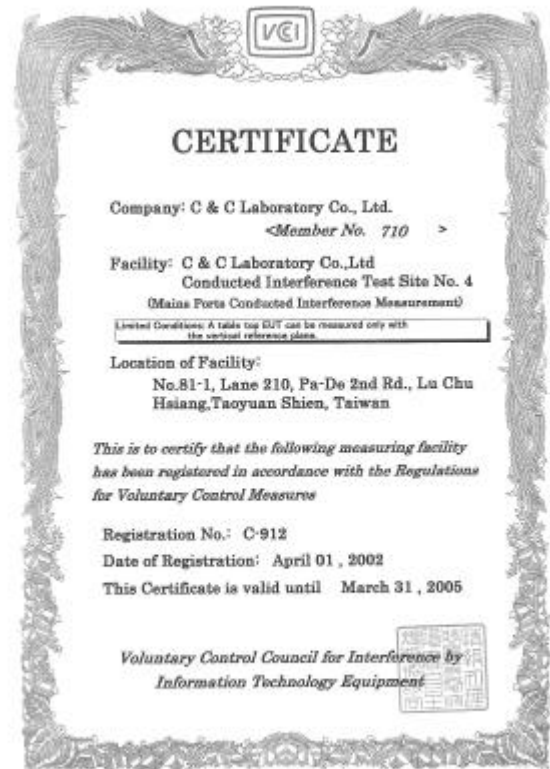
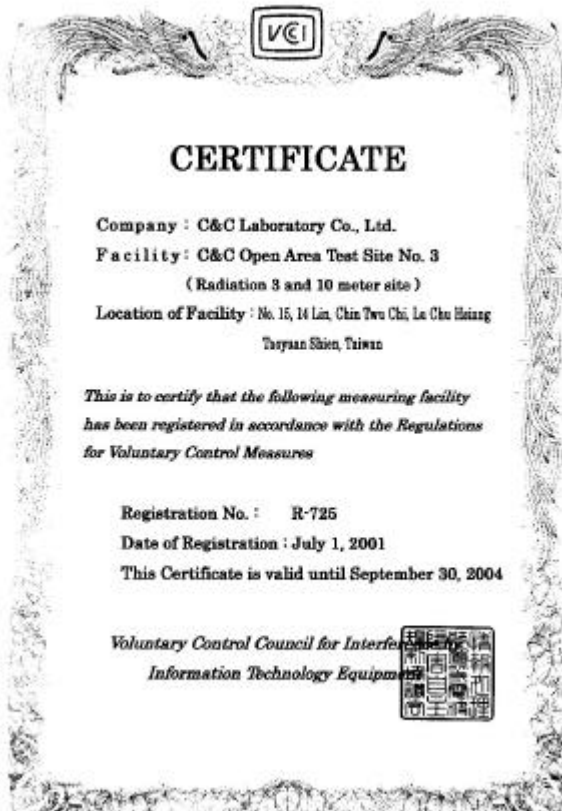
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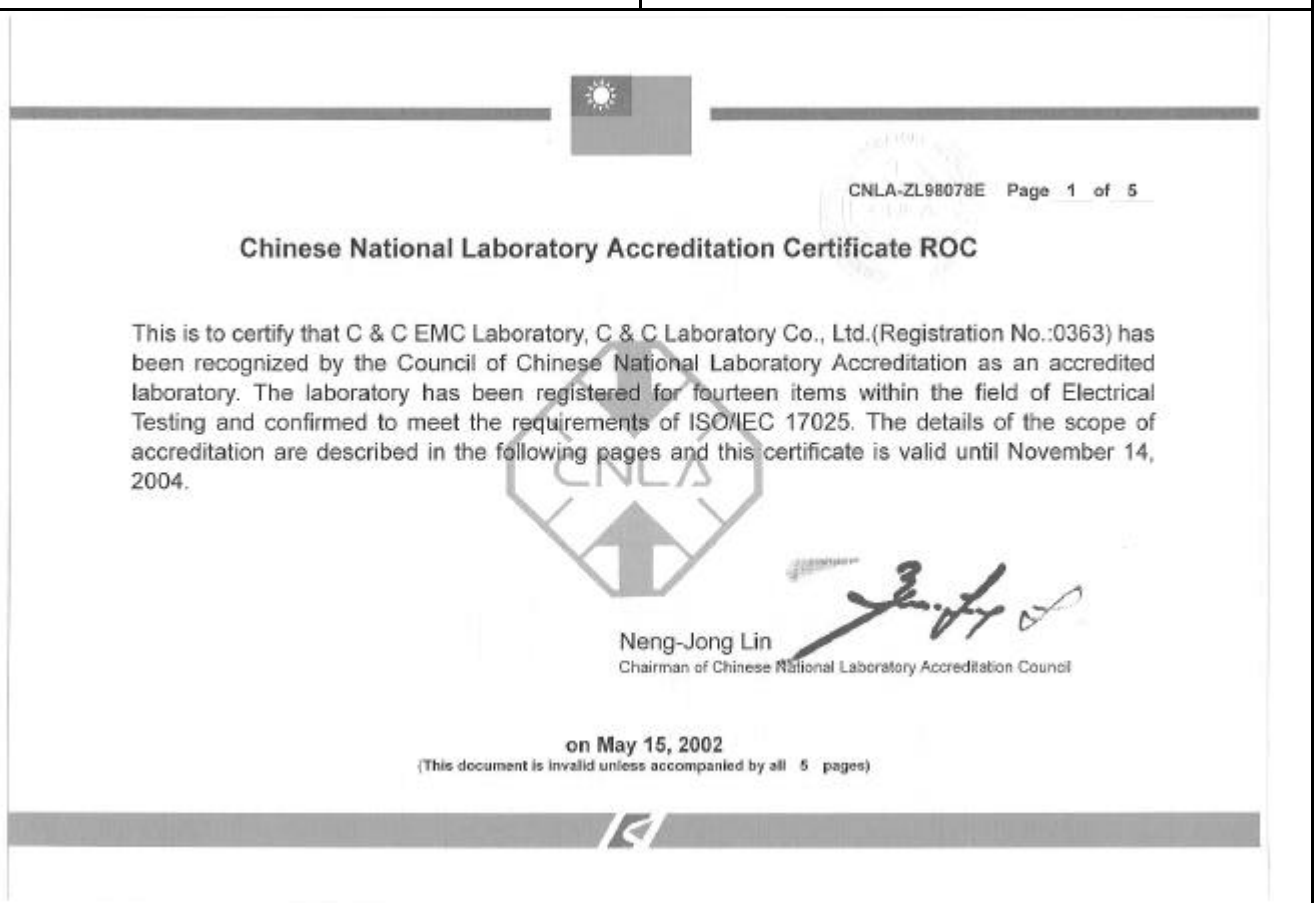
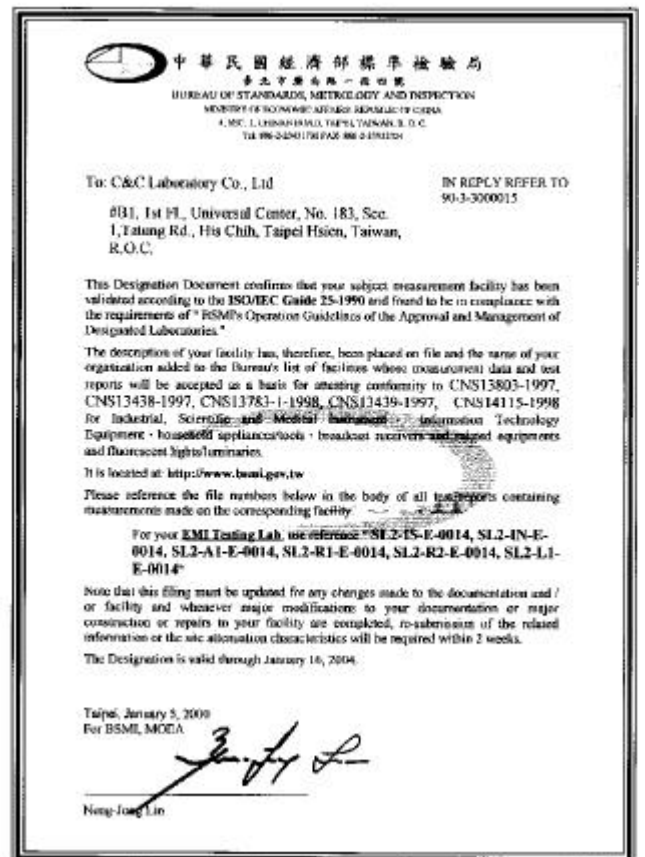
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N-2007 Oslo, NORWAY
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Fax: +47 22 96 90 00









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Organization : C & C Laboratory Co., Ltd.
Laboratory : C & C EMC Laboratory
Registration No. : 0363
Laboratory Head : WANG, Charles
Testing Field : Electrical Testing
Date of Registration : 1998.11.15
Date of Extension : 2001.11.15

| Registration items | Test items | Test Methods | Ranges | Best Test capability recognized | Remarks |
|---|--|--|--|---------------------------------|---------|
| E0101 Low power R.F. equipment | Low power radiators/receivers Low power R. F. Equipment | IUT Low Power Rf Device Technical Specification (2000.10) EUT EN 300 328-1 V1.3.1 (2001-06) EUT EN 300 328-2 V1.2.1 (2001-06) EUT EN 300 220-1 V1.3.1 (2001-06) EUT EN 300 220-2 V1.2.1 (2001-06) EUT EN 300 220-3 V1.1.1 (2001-06) 47 CFR Part 15 Subpart C (2000-10) | 9 kHz-50 GHz | | |
| E0102 Harmonic current emissions | ITE and peripheral products | IEC 61000-3-2(1995) A1(2001) EN 61000-3-2(1995) A1(1998), A2(1998), A1(2000) | EUT Voltage: 0-270VAC (Single Phase) 50/60 Hz EUT current: 0-16 A Harmonic number: 1-40 order | | |
| E0103 Voltage fluctuations and flicker | ITE and peripheral products | IEC 1000-3-3 (1994) EN 61000-3-3 (1995) | EUT Voltage: 0-270 VAC (Single Phase) 50/60 Hz EUT Current: 0-16 A Standard impedance: $R_s = 0.4 \Omega$ | | |



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| Registration items | Test items | Test Methods | Ranges | Best Test capability recognized | Remarks |
|--|---|--|---|---------------------------------|---------|
| E0113 Audio and television (broadcast) receivers and associated equipment | Broadcast receivers and associated equipment | EN 55013:1990+A1; 1994+A13: 1996 CISPR 13:1975+A1:1983 CIS 13439 (1997.5) | EUT Voltage: 100-270 VAC (Single Phase) 50/60 Hz EUT Current: 0-30 A 9 kHz-1.75 GHz Conduction Emission: 0.15-30 MHz Antenna Terminal: 30 MHz-1.75 GHz Radiation Emission: 30 MHz-1000 GHz Disturbance Power: 30-300 MHz | | |
| E0114 Electrical appliances and systems | Household appliances/Electric tools and similar apparatus | EN 55014-1: 1993+A1: 1997+A2: 1999 CISPR 14: 1993+A1: 1996+A2: 1998 CIS 13783-1 (1998.6) | EUT Voltage: 0-270 VAC (Single Phase) 50/60 Hz EUT Current: 0-200 A Conduction Emission: 0.15-30 MHz Disturbance Power: 30-300 MHz | | |
| E0115 Fluorescent lamps and luminaires | Fluorescent lamps and luminaires | CISPR 15 (1992) EN 55015 (1999) CIS 14115 (1998) | EUT Voltage: 0-270 VAC (Single Phase) Conduction emission frequency range: 9 kHz-30 MHz Magnetic interference frequency range: 9 kHz-30 MHz (Magnetic loop antenna) Injection loss frequency range: 150-8600 kHz Lamp EM interference frequency | | |



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| Registration items | Test items | Test Methods | Ranges | Best Test capability recognized | Remarks |
|---|-----------------------------|---|---|---------------------------------|---------|
| EJ0122 Systems and apparatus of the telecommunication and information technology | ITE and peripheral products | CISPR 12 (1997) EN 55032 (1998) CNS 13438 (1997) AS/NZS 3548 (1998) PCC1 (2001) 47 CFR Part 15 Subpart E (2000,10) | range: 30 MHz-26.5 GHz EUT Voltage:0-270 VAC (Single/3 Phase)50/60 Hz EUT Current:0-200 A Conduction interference: 150 kHz-30 MHz Radiation interference: 30 MHz-26.5 GHz | | |
| EJ0202 Electrostatic discharge tests | ITE and peripheral products | IEC 61000-4-2 (2001) EN 61000-4-2 (1995) CNS 13022-1 (1992) | EUT Voltage:100-270 VAC (Single Phase)50/60 Hz EUT Current:0-16 A Air discharge: 0.2-25 kV(+/-) Contact discharge: 0.2-15 kV(+/-) | | |
| EJ0203 Radiated susceptibility tests | ITE and peripheral products | IEC 801-3 (1984) IEC 1000-4-3 (1995) EN 61000-4-3 (1996) BS 60204 (1993) | EUT Voltage:0-270 VAC (Single Phase)50/60 Hz EUT Current:0-30 A Frequency range: 28MHz-1.0 GHz (Field intensity:10 V/m, AM Modulation) | | |
| EJ0204 Electrical fast transient/burst tests | ITE and peripheral products | IEC 801-4 (1988) IEC 1000-4-4 (1995) EN 61000-4-4 (1995) CNS 13022-2 (1992) | EUT Voltage:0-270 VAC (Single/3 phase)50/60 Hz EUT Current:0-200 A Equipment range:0.2-4.5 kV | | |



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| Registration items | Test items | Test Methods | Ranges | Best Test capability recognized | Remarks |
|--|-----------------------------|---|--|---------------------------------|---------|
| EJ0205 Surge/lightening tests | ITE and peripheral products | IEC 1000-4-5 (1995) EN 50142 (1994) CNS 13022-3 (1992) EN 61000-4-5 (1995) | EUT Volt.:0-270 VAC (Single phase)50/60 Hz DC 100V EUT Current:0-16 A (AC/DC) Equipment range:0.2-4.2 kV Test Ports:Power line, Signal line | | |
| EJ0206 Conducted susceptibility tests | ITE and peripheral products | IEC 1000-4-6 (1995) EN 61000-4-6 (1995) EN 50141 (1993) | EUT Voltage:0-270 VAC (Single Phase)50/60 Hz EUT Current:0-16 A Frequency range: 150 kHz-230 MHz (Amplitude:10V, AM Modulation) | | |
| EJ0208 Power frequency magnetic field immunity test | ITE and peripheral products | IEC 1000-4-8 (1995) EN 61000-4-8 (1995) | EUT Voltage:0-270 VAC (Single/3 Phase)50/60 Hz EUT Current:0-16 A Continuous magnetic field: 1-100 A/m | | |
| EJ0211 Voltage dips,short interruptions and voltage variations immunity tests | ITE and peripheral products | IEC 1000-4-11 (1994) EN 61000-4-11 (1994) | EUT Voltage:100-270 VAC (Single Phase)50/60 Hz EUT Current:0-16 A Voltage interruption: 100 % Voltage Dips:0-100 % Voltage variation: Standard variation wave shape | | |
| (Null Below) | | | | | |



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: # 3

| Open Area Test Site # 3 | | | | | |
|-------------------------|-------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Spectrum Analyzer | ADVANTEST | R3261A | N/A | 03/19/2002 | 03/18/2003 |
| EMI Test Receiver | R&S | ESVS20 | 838804/004 | 01/05/2002 | 01/04/2003 |
| Pre-Amplifier | HP | 8447D | 2944A09173 | 03/04/2002 | 03/03/2003 |
| Bilog Antenna | SCHWAZBEC K | VULB9163 | 145 | 07/06/2002 | 07/05/2003 |
| Turn Table | EMCO | 2081-1.21 | 9709-1885 | N.C.R | N.C.R |
| Antenna Tower | EMCO | 2075-2 | 9707-2060 | N.C.R | N.C.R |
| Controller | EMCO | 2090 | 9709-1256 | N.C.R | N.C.R |
| RF Switch | ANRITSU | MP59B | M53867 | N.C.R | N.C.R |
| Site NSA | C&C | N/A | N/A | 09/07/2002 | 09/06/2003 |

Conducted Emission Test Site: # 3

| Conducted Emission Test Site # 3 | | | | | |
|----------------------------------|------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| EMI Test Receiver | R&S | ESHS30 | 828144/003 | 08/08/2002 | 08/07/2003 |
| LISN | R&S | ESH2-Z5 | 843285/010 | 12/10/2001 | 12/09/2002 |
| LISN | EMCO | 3825/2 | 9003-1628 | 07/26/2002 | 07/25/2003 |
| 2X2 WIRE ISN | R&S | ENY22 | 100020 | 06/20/2002 | 06/19/2003 |
| FOUR WIRE ISN | R&S | ENY41 | 100006 | 06/20/2002 | 06/19/2003 |

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.



TEST EQUIPMENT LIST

| 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 | T200 | 16892 | 10/17/2002 | 10/16/2003 |
| 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 |
| Clamp Meter | National | 300K | 11-5980 K | 11/19/2002 | 11/18/2003 |
| 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 |



SECTION 1 EN 55022 (LINE CONDUCTED & RADIATED EMISSION)

MEASUREMENT PROCEDURE (PRELIMINARY LINE CONDUCTED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipment received power from a second LISN supplying power of 110VAC/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode(s) were scanned during the preliminary test:

Mode(s):

1. 1024 x 768 Resolution / 100Mbps
2. 1024 x 768 Resolution / 10Mbps

- 10) After the preliminary scan, we found the following test mode(s) producing the highest emission level.

Mode: 1

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.



MEASUREMENT PROCEDURE (FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 10 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Q.P. mode, then the emission signal was re-checked using an A.V. detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

| Freq. MHz | Q.P. Raw dBuV | Average Raw dBuV | Q.P. Limit dBuV | Average Limit dBuV | Q.P. Margin dB | Average Margin dB | Note |
|--------------|---------------------|------------------------|-----------------------|--------------------------|----------------------|-------------------------|------|
| x.xx | 43.95 | --- | 56 | 46 | -12.05 | --- | L1 |

| | |
|------------|--|
| Freq. | = Emission frequency in MHz |
| Raw dBuV | = Uncorrected Analyzer / Receiver reading |
| Limit dBuV | = Limit stated in standard |
| Margin dB | = Reading in reference to limit |
| Note | = Current carrying line of reading |
| “---“ | = The emission level complied with the Average limits, with at least 2dB margin limits, so no further recheck. |

Calculation example:

$$\text{Margin (dB)} = \text{RAW (dBuV)} - \text{Limit (dBuV)}$$

LINE CONDUCTED EMISSION LIMIT

| Frequency | Maximum RF Line Voltage | |
|---------------|-------------------------|---------|
| | Q.P. | AVERAGE |
| 150kHz-500kHz | 79dBuV | 66dBuV |
| 500kHz-5MHz | 73dBuV | 60dBuV |
| 5MHz-30MHz | 73dBuV | 60dBuV |

Note: The lower limit shall apply at the transition frequency.

MEASUREMENT PROCEDURE (COMMON MODE CONDUCTED EMISSION MEASUREMENT)

- 1) Selecting ISN for unscreened cable or a current probe for screened cable to take measurement.
- 2) The port of the EUT was connected to the remote side support equipment through the ISN/Current Probe and communication in normal condition.
- 3) Making a overall range scan by using the test receiver controlled by controller and record at least six highest emissions for showing in the test report.
- 4) Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- 5) In case of measuring on the screened cable, the current limit shall be applied, otherwise the voltage limit should be applied.
- 6) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

| Freq. MHz | Q.P. Raw dBuV | Average Raw dBuV | Q.P. Limit dBuV | Average Limit dBuV | Q.P. Margin dB | Average Margin dB | Note |
|--------------|---------------------|------------------------|-----------------------|--------------------------|----------------------|-------------------------|------|
| x.xx | 43.95 | --- | 74 | 64 | -30.05 | --- | |

| | |
|------------|--|
| Freq. | = Emission frequency in MHz |
| Raw dBuV | = Uncorrected Analyzer / Receiver reading |
| Limit dBuV | = Limit stated in standard |
| Margin dB | = Reading in reference to limit |
| Note | = Current carrying line of reading |
| “---“ | = The emission level complied with the Average limits, with at least 2 dB margin, so no further recheck. |

COMMON MODE CONDUCTED EMISSION LIMIT AT TELECOMMUNICATION PORTS

| <input checked="" type="checkbox"/> CE-Mark (EN 55022:1998) | | | | | |
|---|-------------------|----------------------|-------|----------------------|-------|
| CLASS | Measuring Band | Voltage limit dB(uV) | | Current limit dB(uA) | |
| | | Q.P. | AV | Q.P. | AV |
| A | 150kHz-500kHz | 97-87 | 84-74 | 53-43 | 40-30 |
| | 500kHz-30MHz | 87 | 74 | 43 | 30 |

Note: The lower limit shall apply at the transition frequency.



MEASUREMENT PROCEDURE

(PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per EN 55022 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per EN 55022.
- 3) All I/O cables were positioned to simulate typical actual usage as per EN 55022.
- 4) The EUT received AC power source from the outlet socket under the turntable. All support equipment received 110VAC/60Hz power from another socket under the turntable, if any.
- 5) The antenna was placed at 10 meter away from the EUT as stated in EN 55022. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
- 6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test mode(s) were scanned during the preliminary test:

Mode(s):

- 1. 1024 x 768 Resolution / 100Mbps**
- 2. 1024 x 768 Resolution / 10Mbps**

- 8) After the preliminary scan, we found the following test mode(s) producing the highest emission level.

Mode: 1.

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



MEASUREMENT PROCEDURE (FINAL RADIATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- 2) The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

| Freq. (MHz) | Raw Data (dBuV/m) | Corr. Factor (dB) | Emiss. Level (dBuV/m) | Limits | Margin (dB) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|
| xx.xx | 14.0 | 11.2 | 26.2 | 30 | -3.8 |

| | |
|-------------------|---|
| Freq. | = Emission frequency in MHz |
| Raw Data (dBuV/m) | = Uncorrected Analyzer / Receiver reading |
| Corr. Factor (dB) | = Correction factors of antenna factor and cable loss |
| Emiss. Level | = Raw reading converted to dBuV and CF added |
| Limit dBuV/m | = Limit stated in standard |
| Margin dB | = Reading in reference to limit |

Calculation example:

$$\text{Margin (dB)} = \text{Emiss. Level (dBuV/m)} - \text{Limits (dBuV/m)}$$
$$\text{Emission Level (dBuV/m)} = \text{Raw Data (dBuV/m)} + \text{Corr Factor (dB)}$$



RADIATED EMISSION LIMIT

| Frequency (MHz) | Distance (m) | Maximum Field Strength Limit (dBuV/m/ Q.P.) |
|--------------------|-----------------|---|
| 30-230 | 10 | 40 |
| 230-1000 | 10 | 47 |

Note: The lower limit shall apply at the transition frequency.

BLOCK DIAGRAM OF TEST SETUP

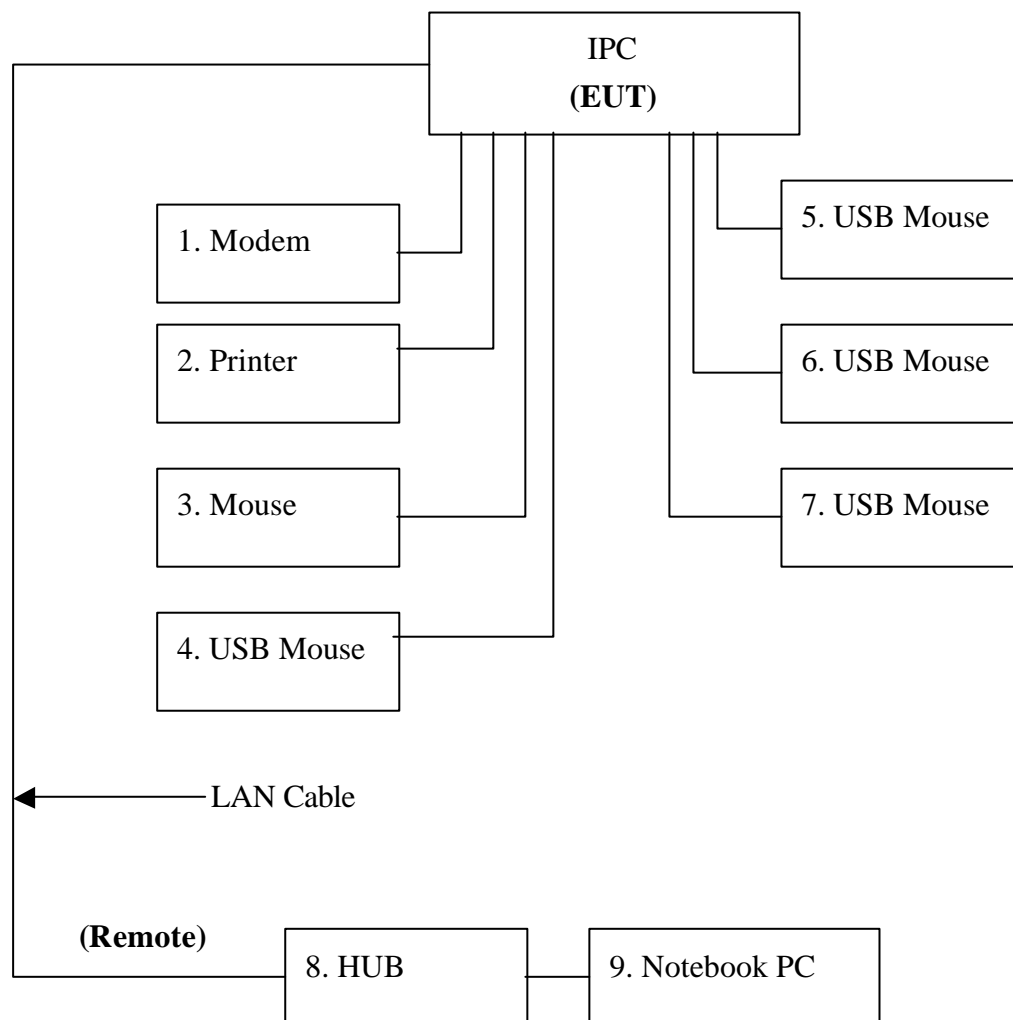
System Diagram of Connections between EUT and Simulators

EUT: IPC

Trade Name: Advantech

Model Number: PWS-1419TP-C1

Power Cord: Unshielded, 1.8m





SUMMARY DATA

(LINE CONDUCTED TEST)

Model Number: PWS-1419TP-C1

Location: Site # 3

Tested by: Michael Chen

Test Mode: Mode 1

Test Results: Passed

Temperature: 28°C

Humidity: 67%RH

(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 |
|-------------|---------------------|--------------------|-----------------------|----------------------|----------------------|---------------------|------|
| 0.335 | 53.40 | --- | 79.00 | 66.00 | -25.60 | --- | L1 |
| 14.150 | 30.80 | --- | 73.00 | 60.00 | -42.20 | --- | L1 |
| 16.230 | 37.90 | --- | 73.00 | 60.00 | -35.10 | --- | L1 |
| 23.130 | 31.10 | --- | 73.00 | 60.00 | -41.90 | --- | L1 |
| 26.610 | 35.00 | --- | 73.00 | 60.00 | -38.00 | --- | L1 |
| 27.160 | 34.20 | --- | 73.00 | 60.00 | -38.80 | --- | L1 |
| 0.335 | 54.20 | --- | 79.00 | 66.00 | -24.80 | --- | L2 |
| 14.150 | 31.60 | --- | 73.00 | 60.00 | -41.40 | --- | L2 |
| 16.230 | 39.40 | --- | 73.00 | 60.00 | -33.60 | --- | L2 |
| 18.240 | 31.10 | --- | 73.00 | 60.00 | -41.90 | --- | L2 |
| 24.350 | 29.90 | --- | 73.00 | 60.00 | -43.10 | --- | L2 |
| 26.610 | 33.20 | --- | 73.00 | 60.00 | -39.80 | --- | 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

(COMMON MODE CONDUCTED EMISSION MEASUREMENT)

(LAN Port)

Model Number: PWS-1419TP-C1

Location: Site # 3

Tested by: Michael Chen

Test Mode: Mode 1

Test Results: Passed

Temperature: 24°C

Humidity: 66%RH

(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 |
|-------------|---------------------|--------------------|-----------------------|----------------------|----------------------|---------------------|---------|
| 0.330 | 68.40 | --- | 90.50 | 77.50 | -22.10 | --- | 10Base |
| 5.000 | 63.10 | --- | 87.00 | 74.00 | -23.90 | --- | 10Base |
| 7.500 | 65.10 | --- | 87.00 | 74.00 | -21.90 | --- | 10Base |
| 10.000 | 79.00 | 55.80 | 87.00 | 74.00 | -8.00 | -18.20 | 10Base |
| 12.500 | 66.70 | --- | 87.00 | 74.00 | -20.30 | --- | 10Base |
| 20.000 | 55.70 | --- | 87.00 | 74.00 | -31.30 | --- | 10Base |
| 0.150 | 69.10 | --- | 90.50 | 77.50 | -21.40 | --- | 100Base |
| 12.810 | 63.80 | --- | 87.00 | 74.00 | -23.20 | --- | 100Base |
| 13.420 | 66.30 | --- | 87.00 | 74.00 | -20.70 | --- | 100Base |
| 16.230 | 69.00 | --- | 87.00 | 74.00 | -18.00 | --- | 100Base |
| 18.240 | 66.70 | --- | 87.00 | 74.00 | -20.30 | --- | 100Base |
| 20.260 | 65.60 | --- | 87.00 | 74.00 | -21.40 | --- | 100Base |

****NOTE: 1. “---” denotes the emission level was less –2 dB to the Average limit, so no re-check anymore.**



SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: PWS-1419TP-C1

Location: Site # 3

Tested by: Michael Chen

Polar: Vertical-10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 22°C

Humidity: 63% RH

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

| Freq. (MHz) | Raw Data (dBuV/m) | Corr. Factor (dB) | Emiss. Level (dBuV/m) | Limits | Margin (dB) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|
| 38.92 | 20.2 | 15.6 | 35.8 | 40.0 | -4.2 |
| 173.25 | 20.9 | 11.8 | 32.7 | 40.0 | -7.3 |
| 181.11 | 21.0 | 12.3 | 33.3 | 40.0 | -6.7 |
| 200.25 | 18.8 | 14.7 | 33.5 | 40.0 | -6.5 |
| 483.92 | 13.1 | 21.4 | 34.5 | 47.0 | -12.5 |
| 564.50 | 11.2 | 22.3 | 33.5 | 47.0 | -13.5 |
| 645.30 | 13.4 | 24.1 | 37.5 | 47.0 | -9.5 |



SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: PWS-1419TP-C1

Location: Site # 3

Tested by: Michael Chen

Polar: Horizontal--10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 22°C

Humidity: 63% RH

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

| Freq. (MHz) | Raw Data (dBuV/m) | Corr. Factor (dB) | Emiss. Level (dBuV/m) | Limits | Margin (dB) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|
| 173.30 | 20.9 | 11.8 | 32.7 | 40.0 | -7.3 |
| 181.26 | 19.9 | 12.4 | 32.3 | 40.0 | -7.7 |
| 200.02 | 19.8 | 14.7 | 34.5 | 40.0 | -5.5 |
| 245.27 | 17.6 | 16.3 | 33.9 | 47.0 | -13.1 |
| 564.57 | 16.8 | 22.3 | 39.1 | 47.0 | -7.9 |
| 600.20 | 13.0 | 23.9 | 36.9 | 47.0 | -10.1 |
| 645.21 | 17.2 | 24.1 | 41.3 | 47.0 | -5.7 |

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

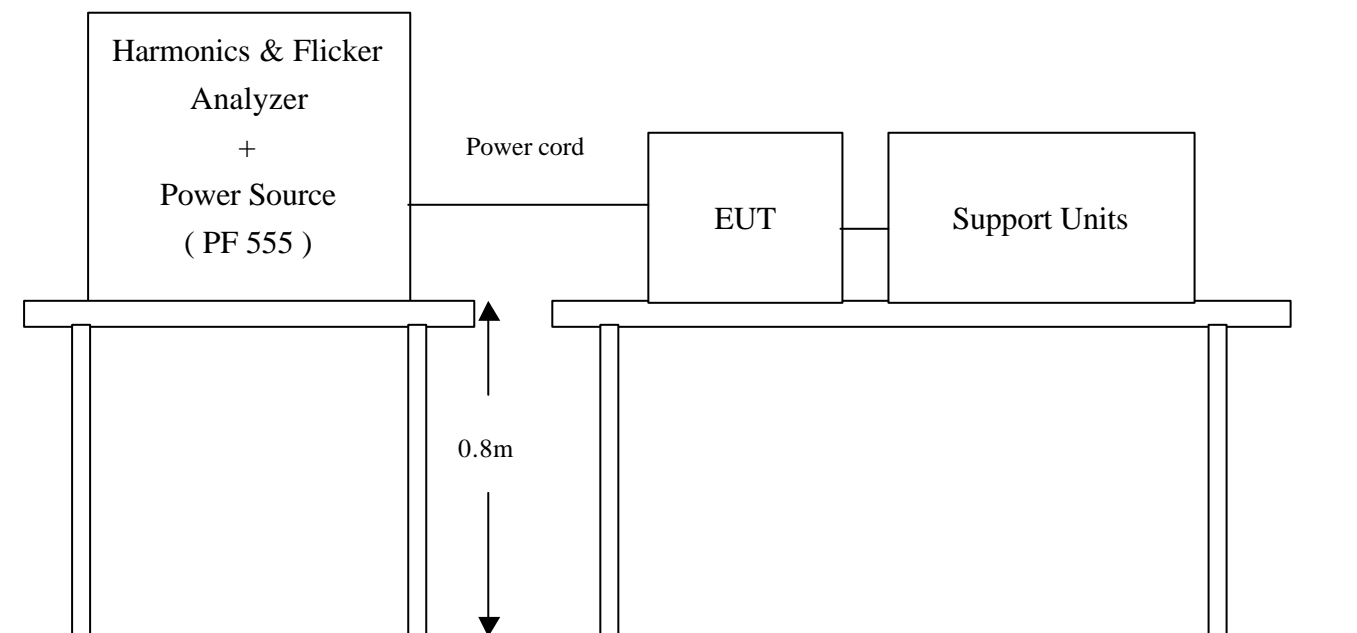
POWER HARMONICS MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-2 (1995 + A1: 1998 + A2: 1998)
Limits : ☒ CLASS A ; ☐ CLASS D
Tester : Michael Chen
Temperature : 22°C
Humidity : 52%
Input Current Wave : Without special wave shape

VOLTAGE FLUCTUATION/FLICKER MEASUREMENT

Port : AC mains
Basic Standard : EN 61000-3-3 (1995)
Limits : § 5 of EN 61000-3-3
Tester : Michael Chen
Temperature : 22°C
Humidity : 52%

Block Diagram of Test Setup:



Result:

Please see the attached test data.



EN 61000-3-2 TEST REPORT 2002/11/29 11:59 AM

Unit: IPC

Model No. : PWS-1419TP-C1

Remarks: TEMP: 22°C HUM: 52%

Operator: Michael Chen

=====

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: 88.9W



TEST DATA

Result: PASS

Harmonic Current Results

| Hn | AMPS | LO Limit | HI Limit | Result |
|----|-------|----------|----------|--------|
| 0 | 0.000 | 0.000 | 0.000 | PASS |
| 1 | 0.391 | NaN | NaN | PASS |
| 2 | 0.001 | 1.080 | 1.080 | PASS |
| 3 | 0.046 | 2.300 | 2.300 | PASS |
| 4 | 0.000 | 0.430 | 0.430 | PASS |
| 5 | 0.011 | 1.140 | 1.140 | PASS |
| 6 | 0.000 | 0.300 | 0.300 | PASS |
| 7 | 0.005 | 0.770 | 0.770 | PASS |
| 8 | 0.000 | 0.230 | 0.230 | PASS |
| 9 | 0.011 | 0.400 | 0.400 | PASS |
| 10 | 0.000 | 0.184 | 0.184 | PASS |
| 11 | 0.015 | 0.330 | 0.330 | PASS |
| 12 | 0.000 | 0.153 | 0.153 | PASS |
| 13 | 0.008 | 0.210 | 0.210 | PASS |
| 14 | 0.000 | 0.131 | 0.131 | PASS |
| 15 | 0.013 | 0.150 | 0.150 | PASS |
| 16 | 0.000 | 0.115 | 0.115 | PASS |
| 17 | 0.008 | 0.132 | 0.132 | PASS |
| 18 | 0.000 | 0.102 | 0.102 | PASS |



| | | | | |
|----|-------|-------|-------|------|
| 19 | 0.007 | 0.118 | 0.118 | PASS |
| 20 | 0.000 | 0.092 | 0.092 | PASS |
| 21 | 0.009 | 0.107 | 0.107 | PASS |
| 22 | 0.000 | 0.084 | 0.084 | PASS |
| 23 | 0.006 | 0.098 | 0.098 | PASS |
| 24 | 0.000 | 0.077 | 0.077 | PASS |
| 25 | 0.005 | 0.090 | 0.090 | PASS |
| 26 | 0.000 | 0.071 | 0.071 | PASS |
| 27 | 0.003 | 0.083 | 0.083 | PASS |
| 28 | 0.000 | 0.066 | 0.066 | PASS |
| 29 | 0.003 | 0.078 | 0.078 | PASS |
| 30 | 0.000 | 0.061 | 0.061 | PASS |
| 31 | 0.005 | 0.073 | 0.073 | PASS |
| 32 | 0.000 | 0.058 | 0.058 | PASS |
| 33 | 0.005 | 0.068 | 0.068 | PASS |
| 34 | 0.000 | 0.054 | 0.054 | PASS |
| 35 | 0.005 | 0.064 | 0.064 | PASS |
| 36 | 0.000 | 0.051 | 0.051 | PASS |
| 37 | 0.004 | 0.061 | 0.061 | PASS |
| 38 | 0.000 | 0.048 | 0.048 | PASS |
| 39 | 0.003 | 0.058 | 0.058 | PASS |
| 40 | 0.000 | 0.046 | 0.046 | PASS |

END OF REPORT



EN 61000-3-3 TEST REPORT 2002/11/29 01:16 PM

Unit: IPC

Model No. : PWS-1419TP-C1 (Continue)

Remarks: TEMP: 22°C HUM: 52%

Operator: Michael Chen

=====

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 | 0.009 | 1.00 | PASS | true |
| Plt max | 0.009 | 0.65 | PASS | true |
| dc % | 0.003 | 3.00 | PASS | true |
| dmax % | 0.002 | 4.00 | PASS | true |
| d(t) sec. | 0.001 | 0.20 | PASS | true |

Power Source Data

| | | | | |
|----------------|-------|-------|------|------|
| Source Pst max | 0.021 | 0.400 | PASS | true |
| % THD | 0.030 | 3.000 | PASS | true |

END OF REPORT



EN 61000-3-3 TEST REPORT 2002/11/29 01:00 PM

Unit: IPC

Model No. : PWS-1419TP-C1 (Manual Switch)

Remarks: TEMP: 22°C HUM: 52%

Operator: Michael Chen

=====

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 | 0.040 | 1.00 | PASS | true |
| Plt max | 0.040 | 0.65 | PASS | true |
| dc % | 0.009 | 3.00 | PASS | true |
| dmax % | 0.008 | 4.00 | PASS | true |
| d(t) sec. | 0.009 | 0.20 | PASS | true |

Power Source Data

| | | | | |
|----------------|-------|-------|------|------|
| Source Pst max | 0.021 | 0.400 | PASS | true |
| % THD | 0.031 | 3.000 | PASS | true |

END OF REPORT

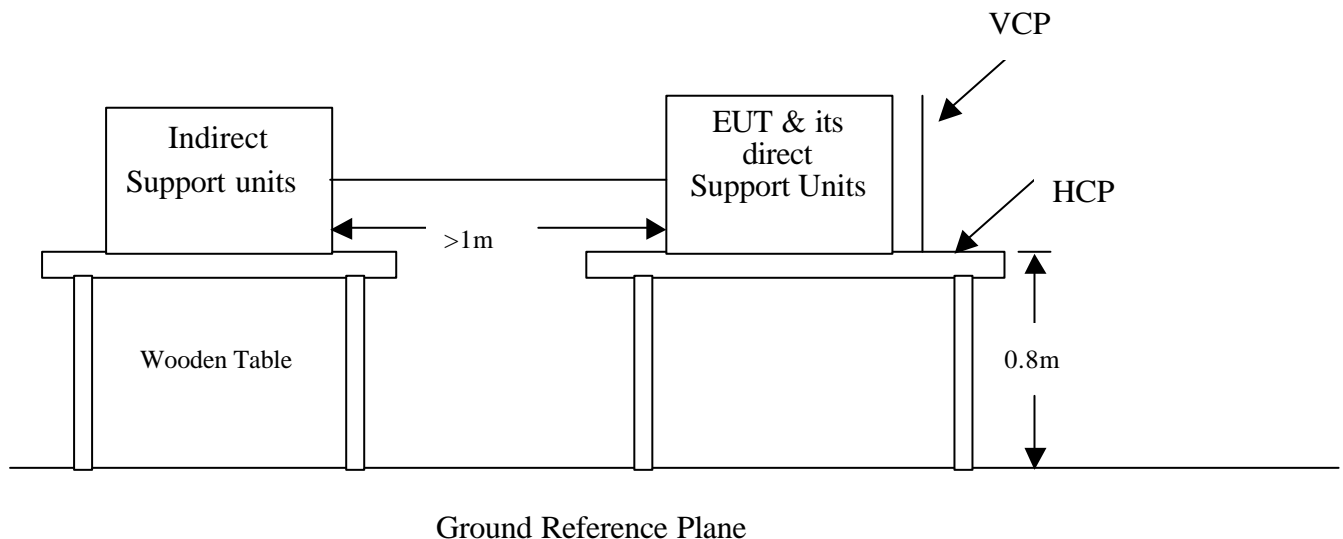
SECTION 3 IEC 61000-4-2 (ELECTROSTATIC DISCHARGE)

ELECTROSTATIC DISCHARGE (ESD) IMMUNITY TEST

Port : Enclosure
Basic Standard : IEC 61000-4-2
Test Level : ± 8 kV (Air Discharge)
 : ± 4 kV (Contact Discharge)
 : ± 4 kV (Indirect Discharge)
Performance Criteria : B (Standard require)
Tester : Michael Chen
Temperature/Humidity: 21°C / 51%
Pressure : 1004 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 1m 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 mode.
4. The EUT sent above message to EUT Panel and 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 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 |
| Mini 10 /Point | ±8kV | Air Discharge | Pass |

*** The tested points to EUT please refer to attach 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

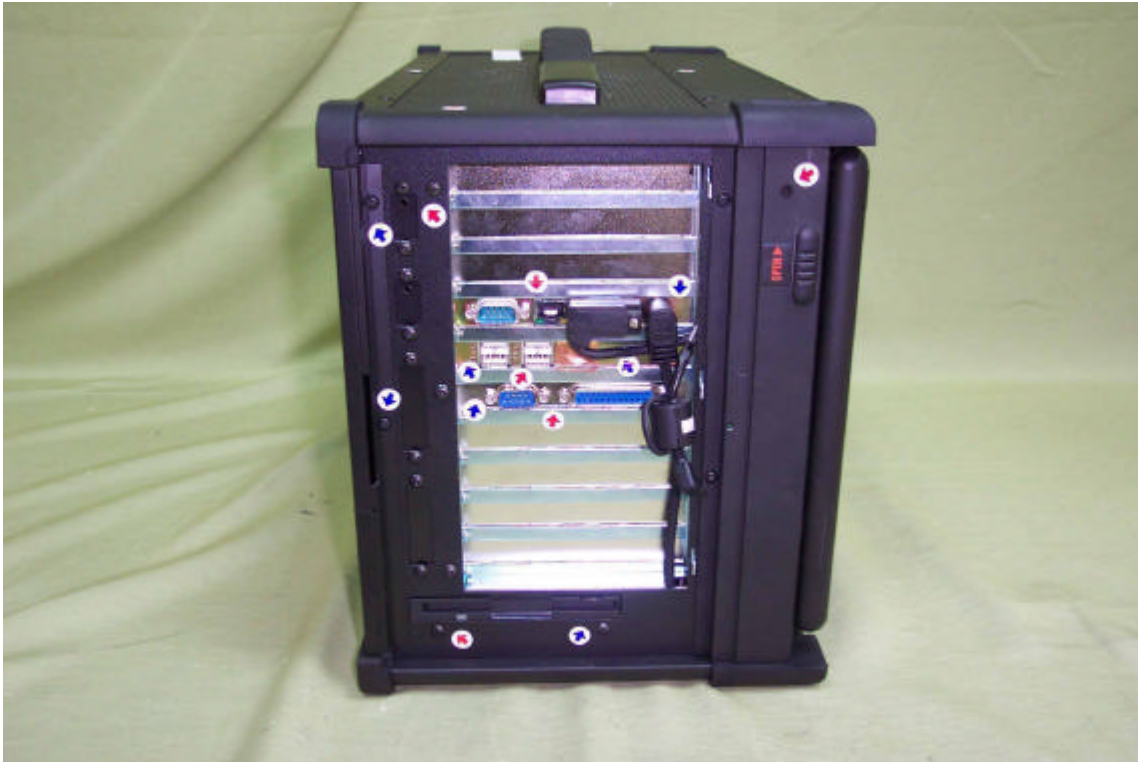
(Photo 1 of 4)



(Photo 2 of 4)



(Photo 3 of 4)



(Photo 4 of 4)

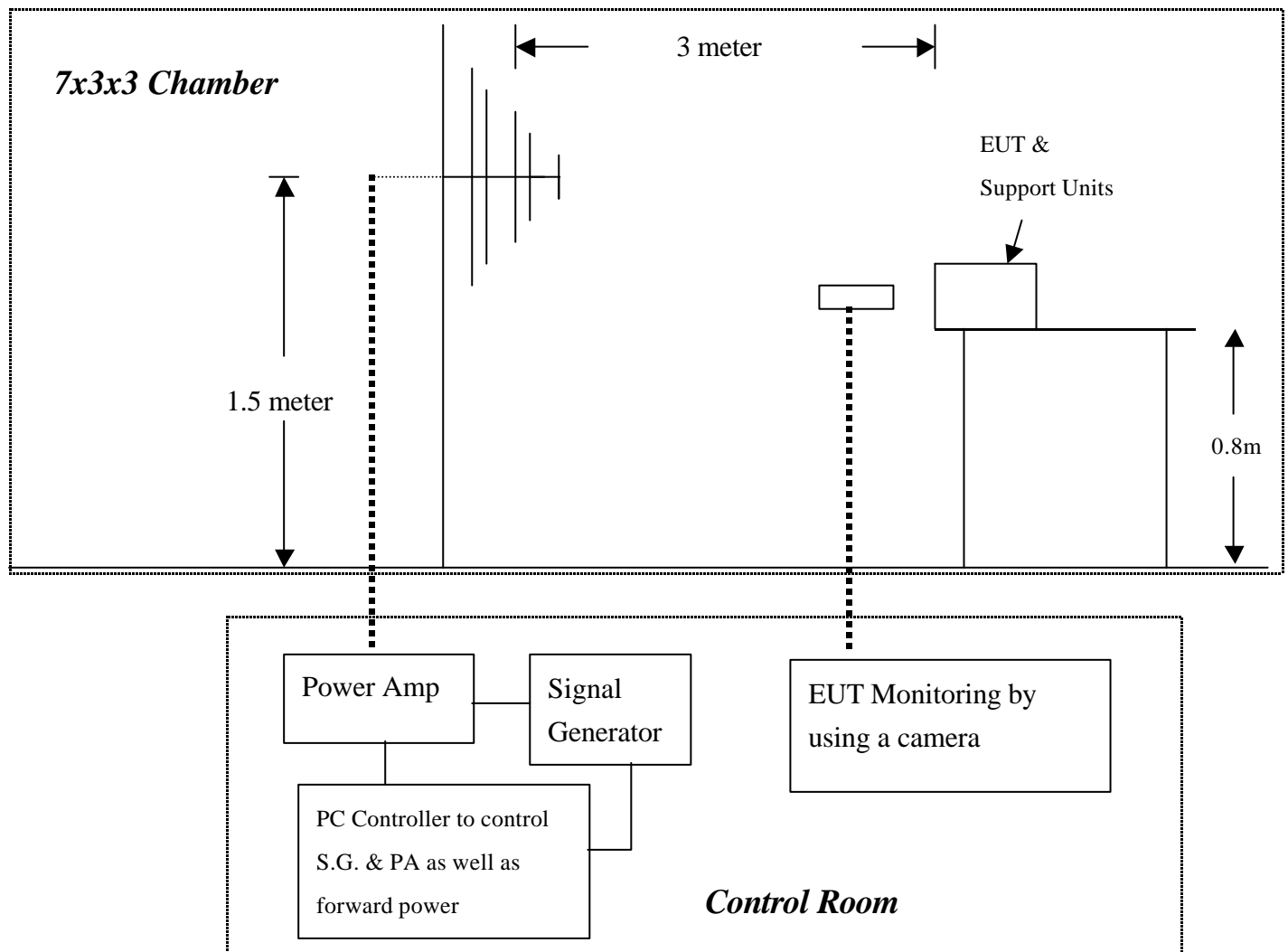


SECTION 4 IEC 61000-4-3 (RADIATED ELECTROMAGNETIC FIELD)

RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

| | |
|-----------------------------|---|
| Port | : Enclosure |
| Basic Standard | : IEC 61000-4-3 |
| Requirements | : 10 V/m / with 80% AM. 1kHz Modulation. (Customer requested) |
| Performance Criteria | : A (Standard require) |
| Tester | : Michael Chen |
| Temperature | : 21°C |
| Humidity | : 59% |
| Pressure | : 1004 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. The LAN communication software was loaded and executed on PC system.
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 test at each side of with specified level from 80MHz to 1000MHz at 1% steps.
6. Recording the test result in following table.
7. 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 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**

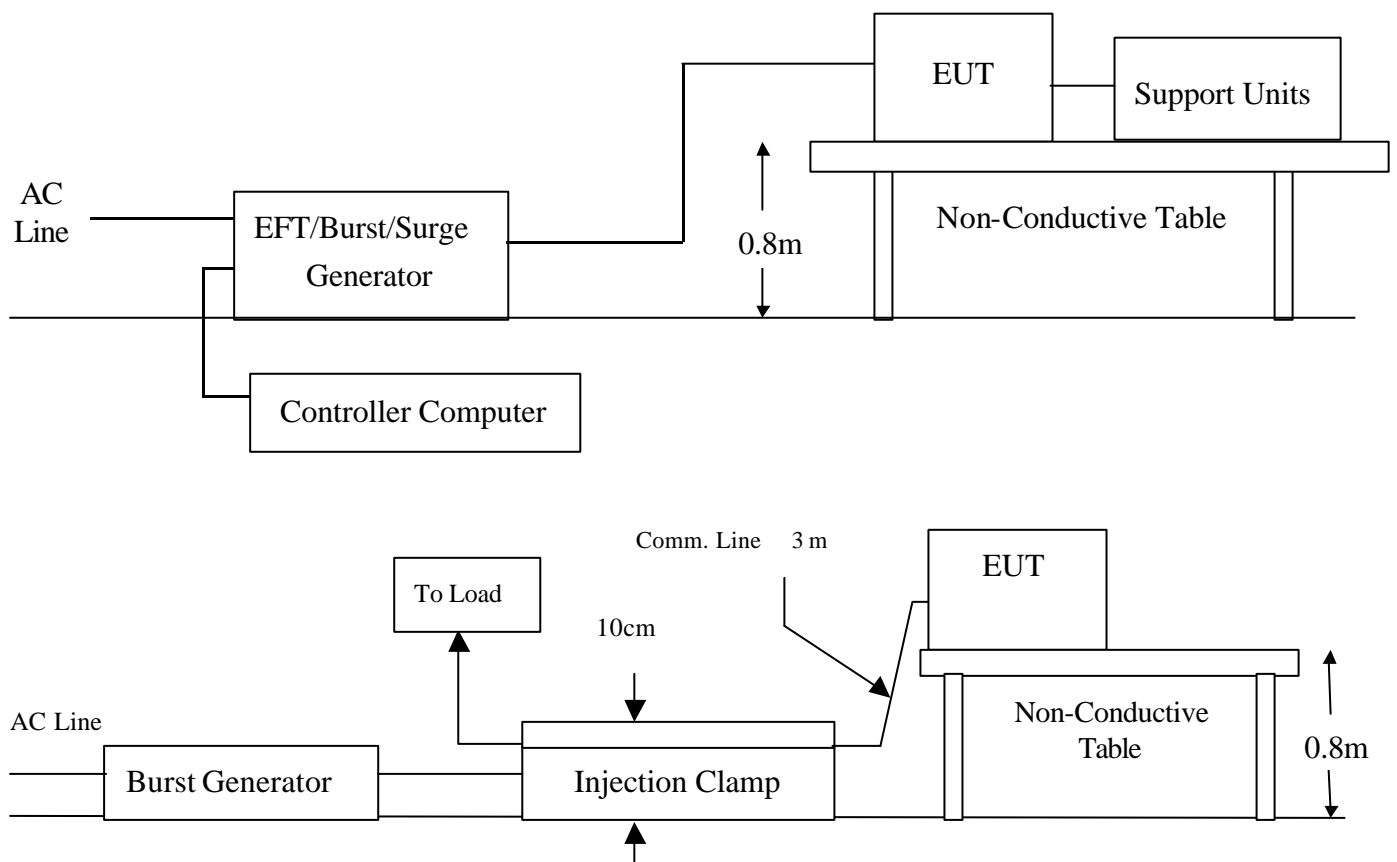
Observation: No any function degraded during the tests.

SECTION 5 IEC 61000-4-4 (FAST TRANSIENTS/BURST)

FAST TRANSIENTS/BURST IMMUNITY TEST

| | |
|-----------------------------|---|
| Port | : On Power Supply Lines and Data Cable |
| Basic Standard | : IEC 61000-4-4 |
| Requirements | : +/- 1kV for Power Supply Lines +/- 0.5kV for LAN Cable |
| Performance Criteria | : B (Standard require) |
| Tester | : Michael Chen |
| Temperature | : 22°C |
| Humidity | : 52% |
| Pressure | : 1004 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 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 Windows 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 | +/- 1 | Direct | Pass |
| N | +/- 1 | Direct | Pass |
| PE | +/- 1 | Direct | Pass |
| L1 + N | +/- 1 | Direct | Pass |
| L1 + PE | +/- 1 | Direct | Pass |
| N + PE | +/- 1 | Direct | Pass |
| L1 + N + PE | +/- 1 | Direct | Pass |
| LAN Cable | +/- 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.

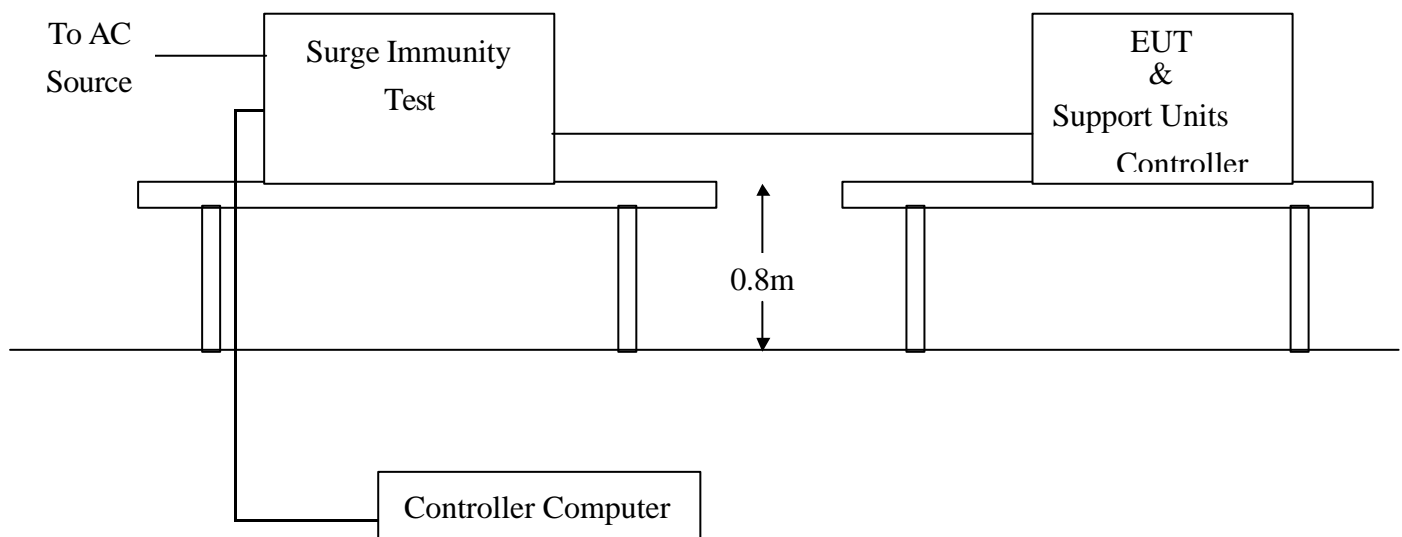
| |
|---|
| <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAILED |
| Observation: The LAN Port were lost communicated, but can be auto recovered as the events disappear. |

SECTION 6 IEC 61000-4-5 (SURGE IMMUNITY)

SURGE IMMUNITY TEST

| | |
|-----------------------------|--|
| Port | : Power Cord |
| Basic Standard | : IEC 61000-4-5 |
| Requirements | : +/- 1kV (Line to Line) +/- 2kV (Line to Ground) |
| Performance Criteria | : B (Standard require) |
| Tester | : Michael Chen |
| Temperature | : 22°C |
| Humidity | : 51% |
| Pressure | : 1004 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 Windows 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 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 |

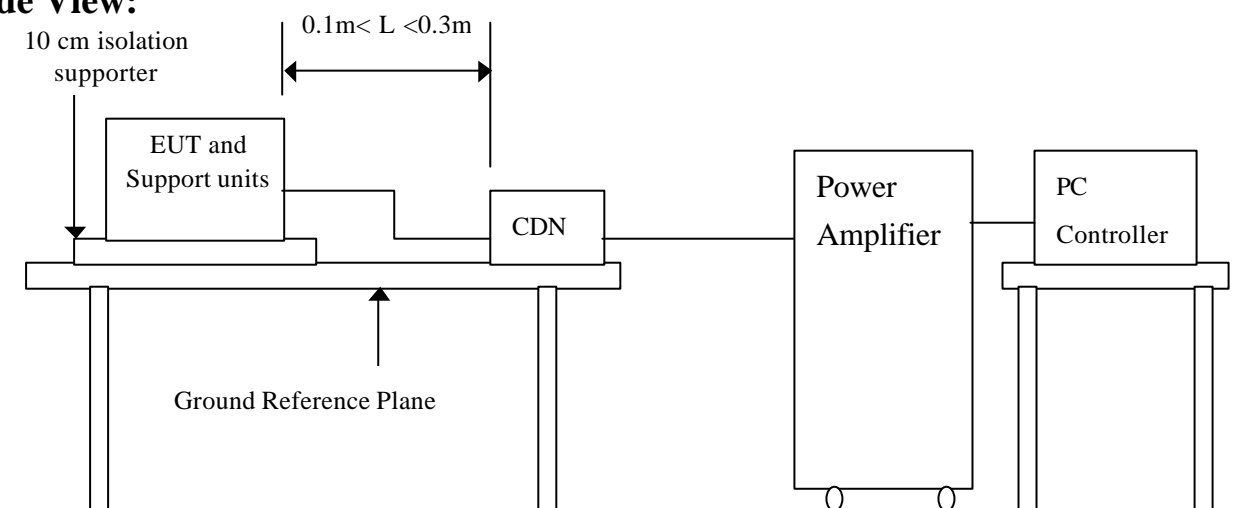
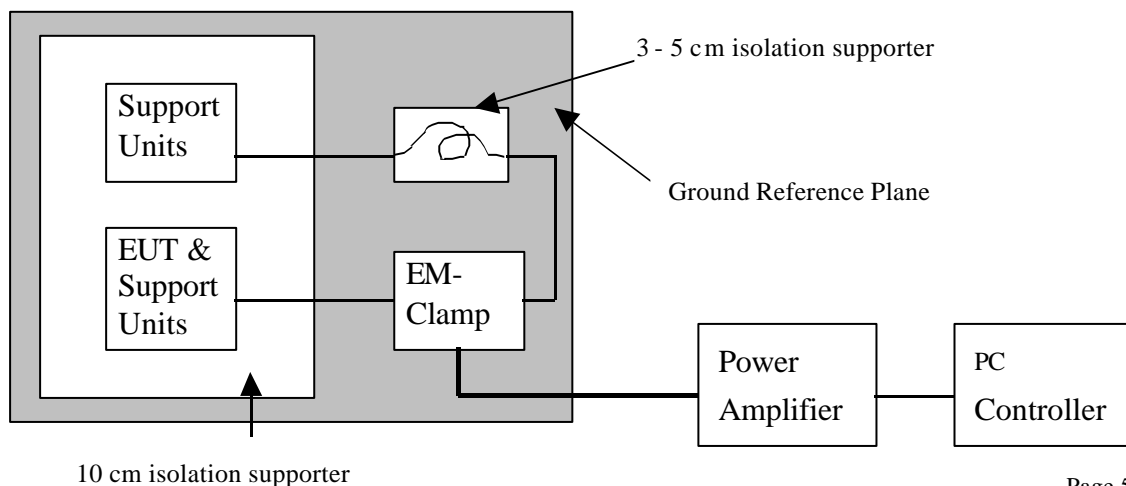
Performance & Result:

- ☒ **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.

| |
|--|
| <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAILED |
| Observation: No any function degraded during the tests. |

| | |
|-----------------------------|---|
| Port | : AC Port and LAN Cable |
| Basic Standard | : IEC 61000-4-6 |
| Requirements | : 10V with modulated (Customer requested) |
| Injection Method | : CDN-M3 for Power Cord EM-Clamp for LAN Cable |
| Performance Criteria | : A (Standard require) |
| Tester | : Michael Chen |
| Temperature | : 21°C |
| Humidity | : 59% |
| Pressure | : 1004 mbar |

Side View:


$$0.1\text{m} < L < 0.3\text{m}$$




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 via EUT.
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**

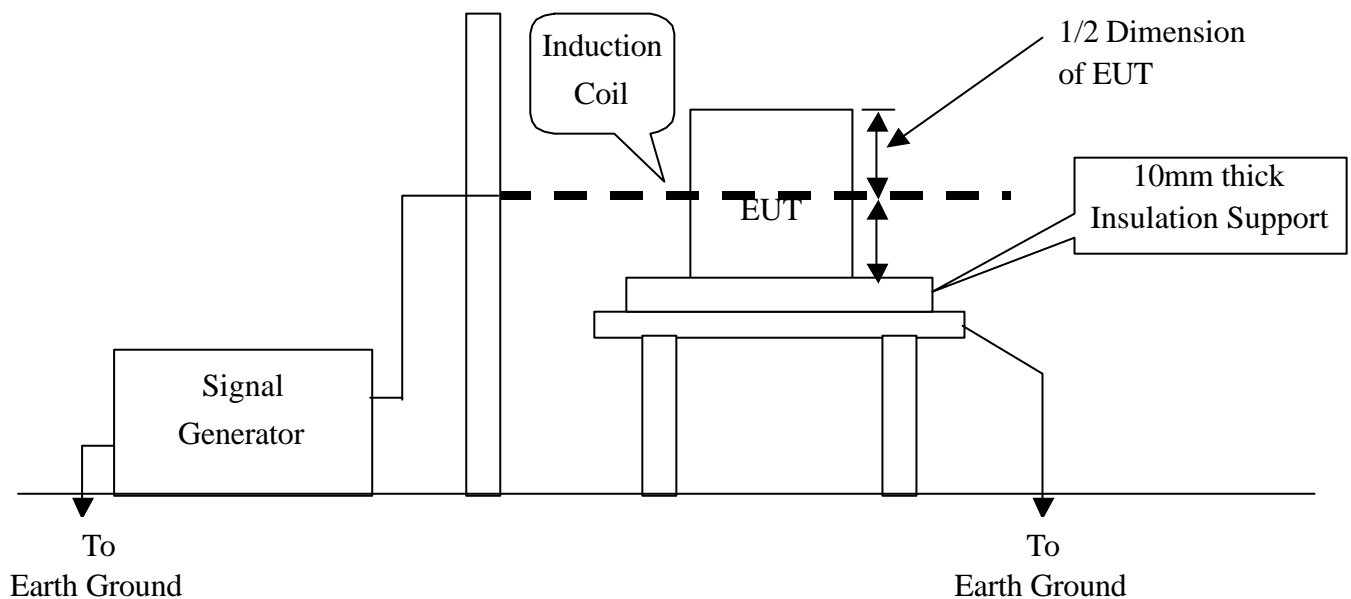
☐ **FAILED**

Observation: No any function degraded during the tests.

SECTION 8 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 | : Michal Chen |
| Temperature | : 22 °C |
| Humidity | : 53% |
| Pressure | : 1004 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 Windows 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.

SECTION 9 IEC 61000-4-11 (VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS)

VOLTAGE DIPS / SHORT INTERRUPTIONS

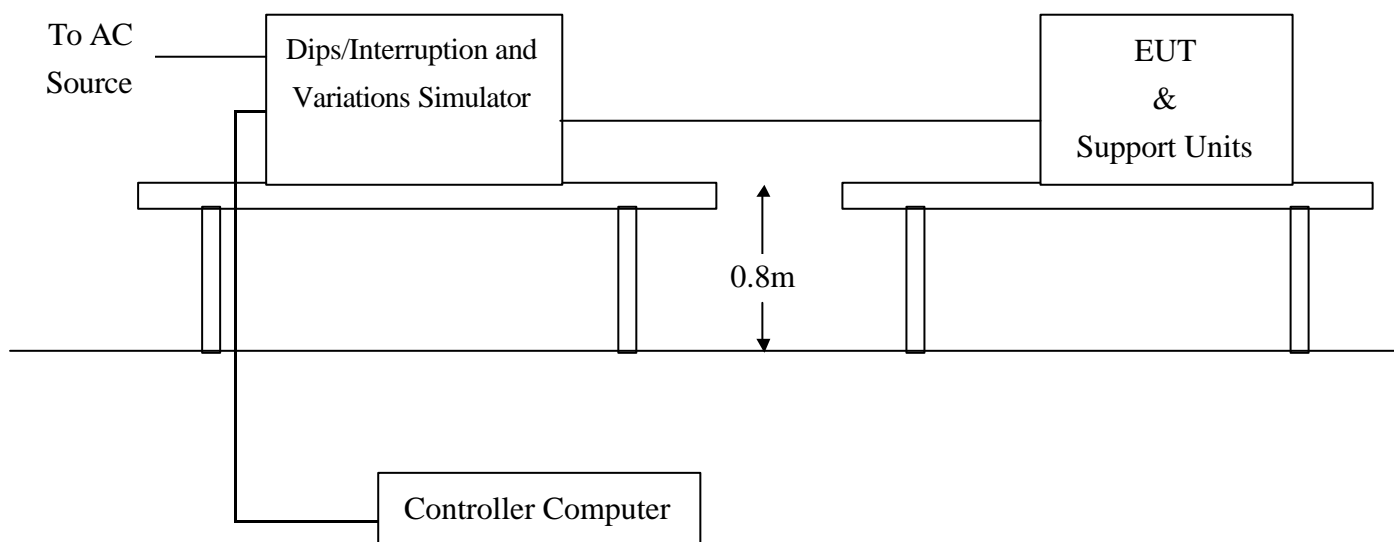
Port : AC mains
Basic Standard : IEC 61000-4-11 (1994)
Requirement : PHASE ANGLE 0, 45, 90, 135, 180, 225, 270, 315 degrees

| Voltage 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.
Tester : Michael Chen
Temperature : 22°C
Humidity : 53%
Pressure : 1004 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 Windows 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 % 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 recovered by manual, as the events disappear. | C |

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



COMMON MODE CONDUCTED EMISSION TEST



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



Right View of EUT



Left View of EUT



Open View of EUT



Power Cable-1



Power Cable-2

