

## FCC CLASS A COMPLIANCE REPORT

for

Electromagnetic Emissions

of

**4-ch. Analog Output Module**

**Trade Name** : Advantech  
**Model Number** : ADAM-4024  
**Serial Number** : N/A  
**Report Number** : 020351-F  
**Date** : May 6, 2002

Prepared for :

**Advantech Co., Ltd.**  
No. 1, Alley 20, Lane 26, Rueiguang Road,  
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Prepared by :



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## VERIFICATION OF COMPLIANCE

**Equipment Under Test:** 4-ch. Analog Input Module

**Trade Name:** Advantech

**Model Number:** ADAM-4024

**Serial Number:** N/A

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

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

**Type of Test:** FCC Class A

**Measurement Procedure:** ANSI C63.4: 1992

**File Number:** 020351-F

**Date of test:** April 30, 2002

**Deviation:** According applicant declaration this EUT is a class A product, and  
to be marketed in industrial environment only.

**Condition of Test Sample:** Normal

The above equipment was tested by C&C Laboratory, Co., Ltd. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart B and the measurement procedure according to ANSI C63.4. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

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

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**Responsible Party**



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**Kurt Chen / Q.A. Manager**

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**Officer of the Responsible Party**



## **SYSTEM DESCRIPTION**

### **EUT Test Procedure:**

1. EUT and Data Acquisition Modules (Customer consign) connected with PC Systems via RS 232 Cable.
2. All I/O port of EUT and Data Acquisition Modules be terminal by Terminal Board. (Customer consign)
3. The test program (Customer provided) was load and executed at Host PC in DOS mode to communicate with EUT via RS 232 Cable.
4. EMI test program sequentially exercised all related I/O's and accessories of Host PC.
5. Repeat 3 to 4. Test program is self-repeating throughout the test.

## PRODUCT INFORMATION

**Housing Type:** Plastic

**EUT Power Rating:** DCV from Power Adapter

**AC power during Test:** 120VAC/60Hz to Power Adapter

**OSC/Clock Frequencies:** 24MHz

**Power Supply Manufacturer:** REIGN POWER

**Power Supply Model Number:** RP1100-24F

**Power Supply Power Rating:** I/P: 100-240VAC, 50-60Hz, 2.5A  
O/P: +24VDC, 4.2A

**AC Power Cord Type:** Unshielded, 1.8m (Detachable)

### I/O Port of EUT:

| I/O PORT TYPES | Q'TY | TESTED WITH |
|----------------|------|-------------|
| 1). RS485 Port | 2    | 2           |

## SUPPORT EQUIPMENT

| No  | Equipment                                           | Model<br># | Serial<br>#    | FCC<br>ID  | Trade<br>Name | Data<br>Cable                    | Power<br>Cord    |
|-----|-----------------------------------------------------|------------|----------------|------------|---------------|----------------------------------|------------------|
| 1.  | PC                                                  | BRIO       | N/A            | FCC DoC    | HP            | N/A                              | Unshielded, 1.8m |
| 2.  | Monitor                                             | CPD-G200   | 2715863        | FCC DoC    | SONY          | Shielded, 1.8m<br>with a core    | Unshielded, 1.8m |
| 3.  | Printer                                             | 2225C      | 2648S40021     | DK467GSM24 | HP            | Shielded, 1.8m                   | Unshielded, 1.8m |
| 4.  | PS/2<br>Keyboard                                    | SK-2800C   | B1C790BCPJCN76 | GYUR79SK   | Compaq        | Shielded, 1.8m                   | N/A              |
| 5.  | PS/2 Mouse                                          | M-CAA43    | LZA11751072    | FCC DoC    | Logitech      | Shielded, 1.8m                   | N/A              |
| 6.  | Isolated<br>RS-232 to<br>RS-422/485<br>Converter    | ADAM-4520  | N/A            | N/A        | Advantech     | RS232 Cable:<br>Unshielded, 1.8m | N/A              |
| 7.  | 8-channel<br>Analog Input<br>Module                 | ADAM-4017  | N/A            | N/A        | Advantech     | N/A                              | N/A              |
| 8.  | 16-channel<br>Isolated<br>Digital input<br>with LED | ADAM-4051  | N/A            | N/A        | Advantech     | N/A                              | N/A              |
| 9.  | Terminal<br>Board                                   | ADAM-3937  | N/A            | N/A        | Advantech     | Shielded, 1.8m x 3               | N/A              |
| 10. | Terminal<br>Board                                   | PYP FLK 20 | N/A            | N/A        | Advantech     | Shielded, 3.2m x 2               | N/A              |
| 11. | Connector x 7                                       | N/A        | N/A            | N/A        | N/A           | Unshielded, 0.1m                 | N/A              |

**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.

## 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 ANSI C63.4 (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 ANSI C63.4.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 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.
- 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 were scanned during the preliminary test:

### Mode:

#### 1. Data transmit

- 10) After the preliminary scan, we found the following test mode 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 Average detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

### Data Sample:

| Freq.<br>MHz | Q.P.<br>Raw<br>dBuV | Average<br>Raw<br>dBuV | Q.P.<br>Limit<br>dBuV | Average<br>Limit<br>dBuV | Q.P.<br>Margin<br>dB | Average<br>Margin<br>dB | Note |
|--------------|---------------------|------------------------|-----------------------|--------------------------|----------------------|-------------------------|------|
| x.xx         | 43.95               | ---                    | 56                    | 46                       | -12.05               | ---                     | L 1  |

|            |                                                                                                          |
|------------|----------------------------------------------------------------------------------------------------------|
| 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. |

## 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 (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 ANSI C63.4 (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 ANSI C63.4.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 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.
- 5) The antenna was placed at 10 meter away from the EUT as stated in ANSI C63.4. 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 were scanned during the preliminary test:

**Mode:**

**1. Data transmit**

- 8) After the preliminary scan, we found the following test mode 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 reference of final testing.

## MEASUREMENT PROCEDURE (FINAL RAIDATED 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, were recorded into a computer ( The antenna position, polarization and turntable position were kept in raw data file ) in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

### Data Sample:

| Freq.<br>(MHz) | Raw<br>Data<br>(dBuV/m) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(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/m and CF added        |
| Limit dBuV/m      | = Limit stated in standard                            |
| Margin dB         | = Reading in reference to limit                       |

## RADIATED EMISSION LIMIT

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

**\*\*Note:** "/" means the limit line is not applicable.

## SUMMARY DATA (LINE CONDUCTED TEST)

**Model Number:** ADAM-4024

**Location:** Site # 3

**Tested by:** Lung Tsai

**Test Mode:** Mode 1

**Test Results:** Passed

**Temperature:** 24°C

**Humidity:** 70%RH

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

| FREQ<br>MHz | Q.P.<br>RAW<br>dBuV | AVG<br>RAW<br>dBuV | Q.P.<br>Limit<br>dBuV | AVG<br>Limit<br>dBuV | Q.P.<br>Margin<br>dB | AVG<br>Margin<br>dB | NOTE |
|-------------|---------------------|--------------------|-----------------------|----------------------|----------------------|---------------------|------|
| 7.948       | 51.70               | ---                | 73.00                 | 60.00                | -21.30               | ---                 | L1   |
| 14.861      | 47.30               | ---                | 73.00                 | 60.00                | -25.70               | ---                 | L1   |
| 22.279      | 48.10               | ---                | 73.00                 | 60.00                | -24.90               | ---                 | L1   |
| 23.763      | 56.20               | ---                | 73.00                 | 60.00                | -16.80               | ---                 | L1   |
| 24.568      | 57.30               | ---                | 73.00                 | 60.00                | -15.70               | ---                 | L1   |
| 25.983      | 51.80               | ---                | 73.00                 | 60.00                | -21.20               | ---                 | L1   |
| 8.023       | 52.40               | ---                | 73.00                 | 60.00                | -20.60               | ---                 | L2   |
| 8.617       | 48.20               | ---                | 73.00                 | 60.00                | -24.80               | ---                 | L2   |
| 22.081      | 50.70               | ---                | 73.00                 | 60.00                | -22.30               | ---                 | L2   |
| 23.707      | 54.30               | ---                | 73.00                 | 60.00                | -18.70               | ---                 | L2   |
| 24.117      | 53.80               | ---                | 73.00                 | 60.00                | -19.20               | ---                 | L2   |
| 25.547      | 53.70               | ---                | 73.00                 | 60.00                | -19.30               | ---                 | L2   |

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

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

## SUMMARY DATA (RADIATED EMISSION TEST)

**Model Number:** ADAM-4024

**Location:** Site # 1

**Tested by:** Tommy Lin

**Polar:** Vertical--10m

**Test Mode:** Mode 1

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 27°C

**Humidity:** 67%RH

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

| Freq.<br>(MHz) | Raw<br>Data<br>( dBuV/m ) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(dB) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|
| 55.67          | 27.6                      | 8.5                     | 36.1                          | 40.0   | -3.9           |
| 72.81          | 24.3                      | 5.9                     | 30.2                          | 40.0   | -9.8           |
| 136.81         | 20.6                      | 12.2                    | 32.8                          | 40.0   | -7.2           |
| 166.20         | 20.2                      | 10.4                    | 30.6                          | 40.0   | -9.4           |
| 197.28         | 20.8                      | 10.9                    | 31.7                          | 40.0   | -8.3           |
| 229.57         | 19.9                      | 10.9                    | 30.8                          | 40.0   | -9.2           |

## SUMMARY DATA

### (RADIATED EMISSION TEST)

**Model Number:** ADAM-4024

**Location:** Site # 1

**Tested by:** Tommy Lin

**Polar:** Horizontal--10m

**Test Mode:** Mode 1

**Test Results:** Passed

**Detector Function:** Quasi-Peak

**Temperature:** 27°C

**Humidity:** 67%RH

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

| Freq.<br>(MHz) | Raw<br>Data<br>( dBuV/m ) | Corr.<br>Factor<br>(dB) | Emiss.<br>Level<br>( dBuV/m ) | Limits | Margin<br>(dB) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|
| 84.71          | 22.7                      | 8.0                     | 30.7                          | 40.0   | -9.3           |
| 126.27         | 19.7                      | 11.9                    | 31.6                          | 40.0   | -8.4           |
| 152.71         | 19.9                      | 10.8                    | 30.7                          | 40.0   | -9.3           |
| 191.72         | 21.0                      | 11.1                    | 32.1                          | 40.0   | -7.9           |
| 203.86         | 19.9                      | 10.7                    | 30.6                          | 40.0   | -9.4           |
| 229.40         | 21.6                      | 10.9                    | 32.5                          | 40.0   | -7.5           |

## TEST FACILITY

- Location:** No. 81-1, 210 Lane, Pa-de 2<sup>nd</sup> Road, Lu-Chu Hsiang, 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 22/EN 55022 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**  
Taipei, Taiwan, R.O.C

for technical competence in the field of

### Electrical (EMC) 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 Guide 25-1996 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 26<sup>th</sup> day of April, 2000.



*John W. Phillips*  
President  
For the Accreditation Council  
Certificate Number 824-01  
Valid to January 31, 2002

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



American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC GUIDE 25-1996 and EN 45001-1997

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### ELECTRICAL (EMC)

Valid to January 31, 2002

Certificate Number: 824-01

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

Electrical Emissions - Radiated - 3 & 10 MHz to 26.5 GHz (Site 1, 2, 3 and 4)  
Electrical Emissions - AC Power - 0 - 100 V, 50 - 60 Hz (Site 1, 2, 3 and 4)  
Electrical Immunity - Radiated - 21 - 80 MHz / 270mV to 1 GHz / 10V/m  
Electrical Immunity - AC Power, DC Power, Voltage & Current  
Electrical Fast Transient (EFT)  
Electrostatic Discharge (ESD) to 21 kV  
Electrical Power Surges  
Power Magnetic Field Immunity  
Voltage Dips, Swells, Variations

### On the following production equipment:

Computer Components and Peripherals, Networking Components, Wireless Communications Components, Electronic Components, Subsystems, Home Appliances

### Using the following test methods (types) (standards) (protocols):

Cable Tethered Regulations (CPR) 47, FCC Part 15 using ANSI C63.4  
AS/NZS 3548  
BSME CMB: 13418, 13419, 13420, 13421  
CISPR 11, 14, 22  
EN 50081-1, 50081-2, 50082, 50083, 50084, 50085-1, 50085-2, 50085-3, 50085-4, 50085-5, 50085-6, 50085-7, 50085-8, 50085-9, 50085-10, 50085-11, 50085-12, 50085-13, 50085-14, 50085-15, 50085-16, 50085-17, 50085-18, 50085-19, 50085-20, 50085-21, 50085-22, 50085-23, 50085-24, 50085-25, 50085-26, 50085-27, 50085-28, 50085-29, 50085-30, 50085-31, 50085-32, 50085-33, 50085-34, 50085-35, 50085-36, 50085-37, 50085-38, 50085-39, 50085-40, 50085-41, 50085-42, 50085-43, 50085-44, 50085-45, 50085-46, 50085-47, 50085-48, 50085-49, 50085-50, 50085-51, 50085-52, 50085-53, 50085-54, 50085-55, 50085-56, 50085-57, 50085-58, 50085-59, 50085-60, 50085-61, 50085-62, 50085-63, 50085-64, 50085-65, 50085-66, 50085-67, 50085-68, 50085-69, 50085-70, 50085-71, 50085-72, 50085-73, 50085-74, 50085-75, 50085-76, 50085-77, 50085-78, 50085-79, 50085-80, 50085-81, 50085-82, 50085-83, 50085-84, 50085-85, 50085-86, 50085-87, 50085-88, 50085-89, 50085-90, 50085-91, 50085-92, 50085-93, 50085-94, 50085-95, 50085-96, 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ENG 3/9  
A/D

22 January 1999

C & C Laboratory Co Ltd  
14/F  
No. 344  
Fu Ching Street  
Taipei  
TAIWAN ROC

Attention: Mr Tony Huang

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 1999. 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, DP16, 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 Dyke  
Senior Technical Officer (Regulatory)

Operations and Risk Management Branch, Ministry of Commerce Building, 34 Zhonghua Road, Neihu, New Taipei  
R.O.C. Box 247, Taipei. (886) 21006, Fax: (886) 271 7498



ENG 3/9  
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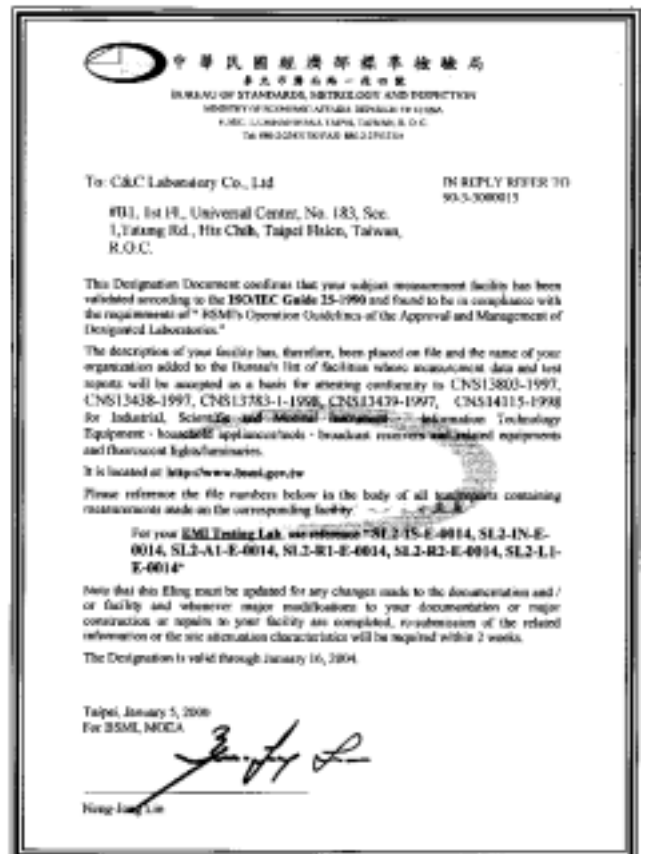
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World-wide Testing and Certification

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, Chia Tzu Chai, Lu Chu Hsiang,  
Taoyuan 338, Taiwan R.O.C.

Scope of Authorisation: All CENELEC and EMI standards (ENs and ETNs that are listed on the accompanying page, and, all of the corresponding CISPR, IEC, and ISO EMI standards). This authorisation covers all of the EMC-related testing and documentation within the scope of the *Radio and Telecommunications Terminal Equipment (RATTE) Directive (i.e. 1999/5/EC)*.

NOTE: This authorisation also covers EMC-related testing and documentation that is within the scope of Article 18.5 of the EMC Directive (i.e. 1989/39/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 19. 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 assessing 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 the Authorisation, the information given in the enclosed ELA-IMP(s) (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.

On 26 April 2001

For Nemko AS:

*Kjetil Bergh*

Kjetil Bergh, Nemko Group EMC Co-ordinator

Printed address:  
Nemko AS  
P.O. Box 115  
N-2007 Kjeller, Norway

Telephone:  
+47 63 90 00 00  
Fax:  
+47 63 90 00 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, RATTE

|                   |                   |                   |
|-------------------|-------------------|-------------------|
| EN 301 221-1:1997 | EN 301 221-2:1997 | EN 301 221-3:1997 |
| EN 301 222-1:1997 | EN 301 222-2:1997 | EN 301 222-3:1997 |
| EN 301 223-1:1997 | EN 301 223-2:1997 | EN 301 223-3:1997 |
| EN 301 224-1:1997 | EN 301 224-2:1997 | EN 301 224-3:1997 |
| EN 301 225-1:1997 | EN 301 225-2:1997 | EN 301 225-3:1997 |
| EN 301 226-1:1997 | EN 301 226-2:1997 | EN 301 226-3:1997 |
| EN 301 227-1:1997 | EN 301 227-2:1997 | EN 301 227-3:1997 |
| EN 301 228-1:1997 | EN 301 228-2:1997 | EN 301 228-3:1997 |

### Basic standards

|                                                       |                                                       |                                                       |
|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| EN 55001-1:1997 + A1:98<br>IEC 61000-4-1:1995 + A1:98 | EN 55001-2:1997 + A1:98<br>IEC 61000-4-2:1995 + A1:98 | EN 55001-3:1997 + A1:98<br>IEC 61000-4-3:1995 + A1:98 |
| EN 55002-1:1997<br>IEC 61000-5:1997                   | EN 55002-2:1997<br>IEC 61000-6:1997                   | EN 55002-3:1997<br>IEC 61000-7:1997                   |
| EN 55003-1:1997<br>IEC 61000-8:1997                   | EN 55003-2:1997<br>IEC 61000-9:1997                   | EN 55003-3:1997<br>IEC 61000-10:1997                  |
| EN 55004-1:1997<br>IEC 61000-11:1997                  | EN 55004-2:1997<br>IEC 61000-12:1997                  | EN 55004-3:1997<br>IEC 61000-13:1997                  |

On 26 April 2001

Kjetil Bergh, Nemko Group EMC Co-ordinator

Printed address:  
Nemko AS  
P.O. Box 115  
N-2007 Kjeller, Norway

Telephone:  
+47 63 90 00 00  
Fax:  
+47 63 90 00 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, Chia Tzu Chai, 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 19. 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 assessing conformity to these EMC Standards for the products in question under the European Union EMC Directive (1989/39/EEC as amended by 92/31/EEC and 98/13/EC).

In case of applications for Product 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-IMP(s) (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.

On 26 April 2001

For Nemko AS:

*Kjetil Bergh*

Kjetil Bergh, Nemko Group EMC Co-ordinator

Printed address:  
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P.O. Box 115  
N-2007 Kjeller, Norway

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Fax:  
+47 63 90 00 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, Chia Tzu Chai, Lu Chu Hsiang,  
Taoyuan 338, Taiwan R.O.C.

Scope of Authorisation: EN 60601-1-2 and IEC 60601-1-2, the *Common 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 19. 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 assessing 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 (AIMDD), 90/269/EEC, (as applicable).

In case of applications for Product 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 the Authorisation, the information given in the enclosed ELA-IMP(s) (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.

On 26 April 2001

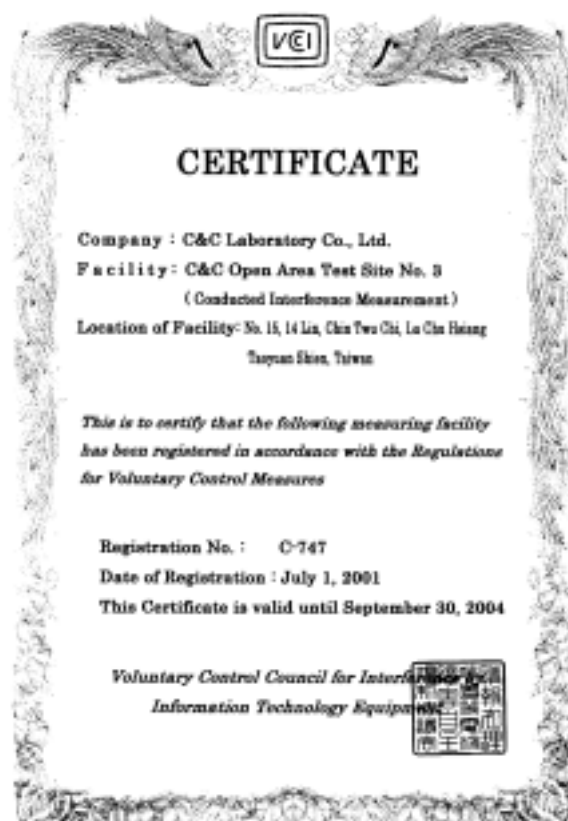
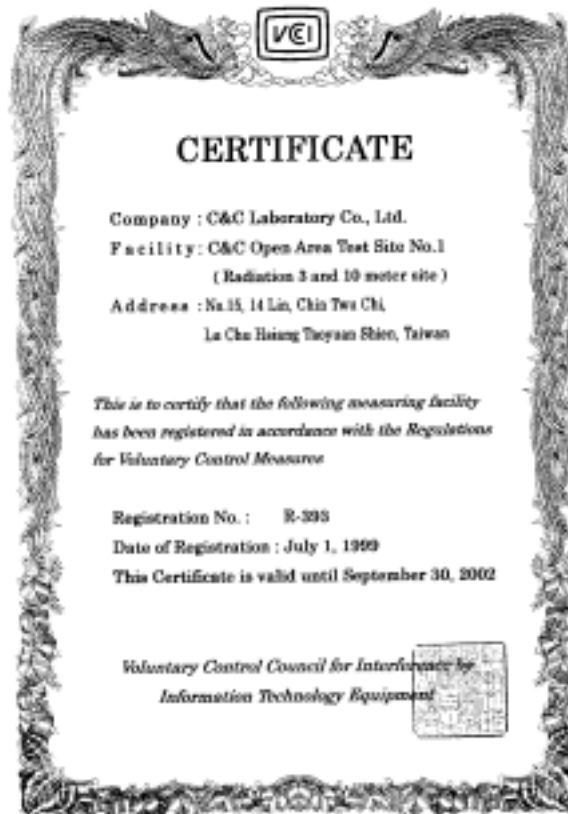
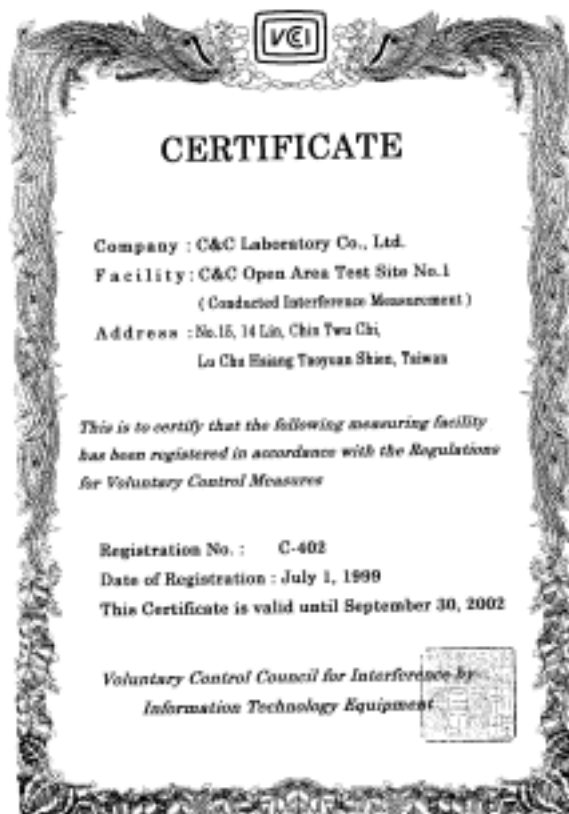
For Nemko AS:

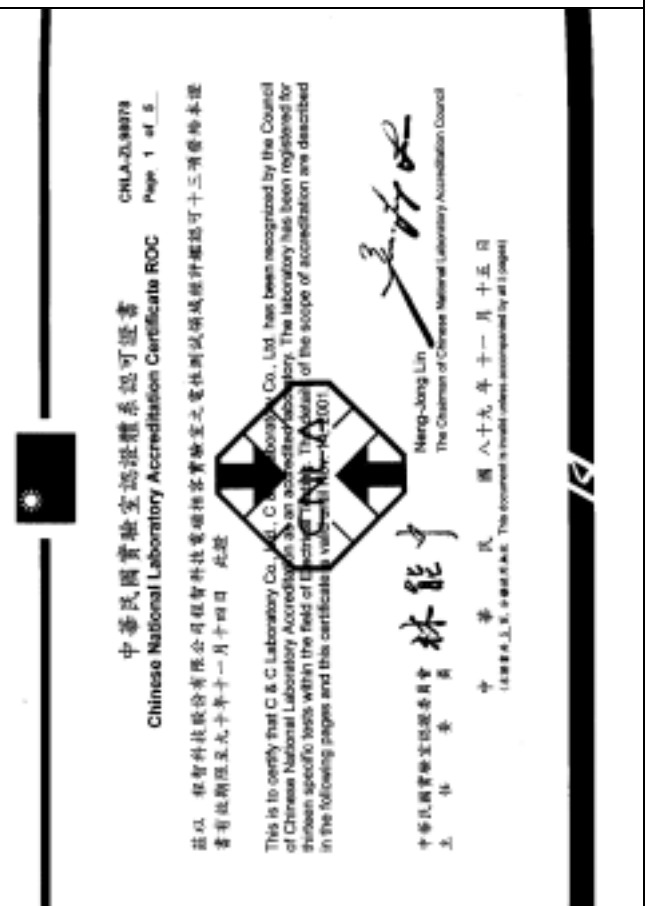
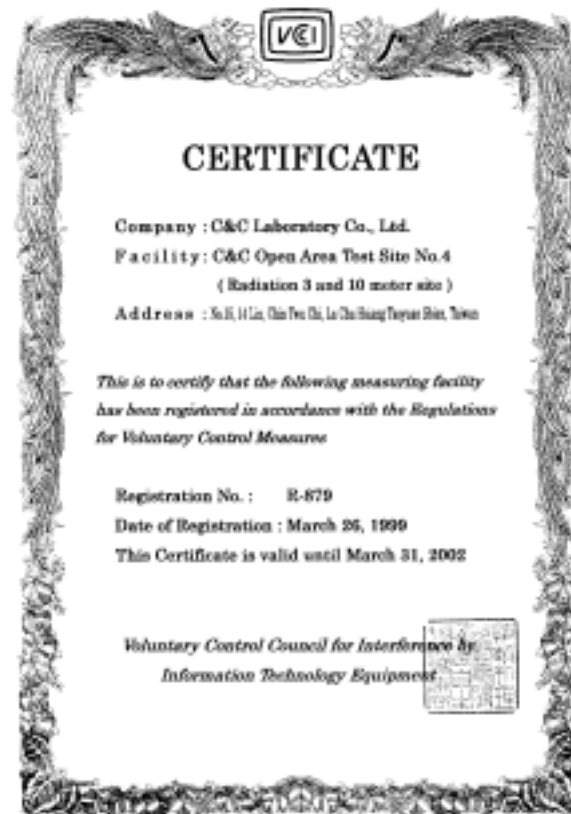
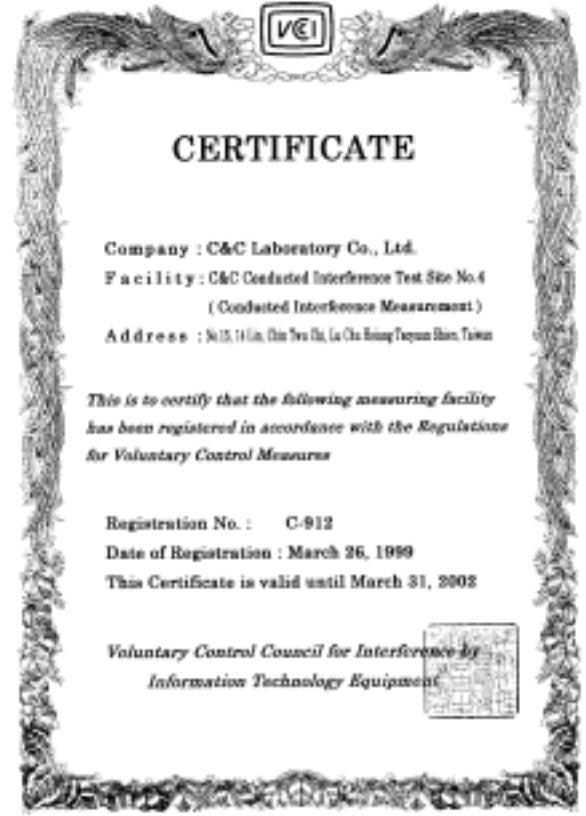
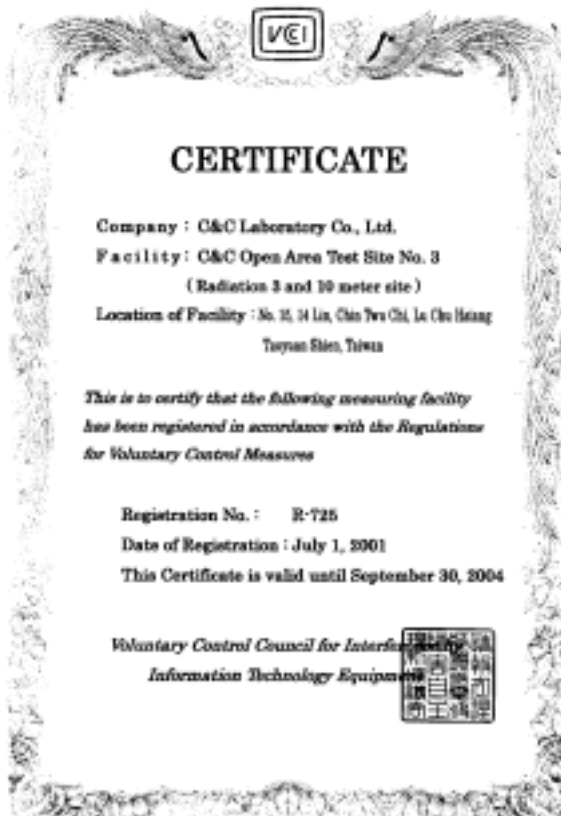
*Kjetil Bergh*

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## TEST EQUIPMENT LIST

**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 10kHz to 1.0 GHz or above.

**Equipment used during the tests:**

**Open Area Test Site:** # 1

| Open Area Test Site # 1 |            |              |               |            |            |
|-------------------------|------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE          | MFR        | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Q.P Adaptor             | HP         | 85650A       | 2811A01399    | 06/19/2001 | 06/18/2002 |
| RF Pre-selector         | HP         | 85685A       | 2947A01064    | 06/19/2001 | 06/18/2002 |
| Spectrum Analyzer       | HP         | 8568B        | 3001A05004    | 06/19/2001 | 06/18/2002 |
| S.P.A Display           | HP         | 85662A       | 3014A18846    | 06/19/2001 | 06/18/2002 |
| Precision Dipole        | SCHWAZBECK | VHAP         | 998/999       | 05/17/2001 | 05/16/2002 |
| Precision Dipole        | SCHWAZBECK | UHAP         | 981/982       | 05/17/2001 | 05/16/2002 |
| Bilog Antenna           | CHASE      | CBL6112A     | 2309          | 02/09/2002 | 02/08/2003 |
| Turn Table              | EMCO       | 2081-1.21    | N/A           | N.C.R      | N.C.R      |
| Antenna Tower           | EMCO       | 2075-2       | 9707-2604     | N.C.R      | N.C.R      |
| Controller              | EMCO       | 2090         | N/A           | N.C.R      | N.C.R      |
| RF Switch               | ANRITSU    | MP59B        | M54367        | N.C.R      | N.C.R      |
| Site NSA                | C&C        | N/A          | N/A           | 11/03/2001 | 11/02/2002 |
| Spectrum Analyzer       | ADVANTEST  | R3261A       | 21720279      | 08/16/2001 | 08/15/2002 |

**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  | ESCS30       | 847793/012    | 12/19/2001 | 12/18/2002 |
| LISN                             | R&S  | ESH2-Z5      | 843285/010    | 12/10/2001 | 12/09/2002 |
| LISN                             | EMCO | 3825/2       | 9003-1628     | 07/16/2001 | 07/15/2002 |

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.

## BLOCK DIAGRAM OF TEST SETUP

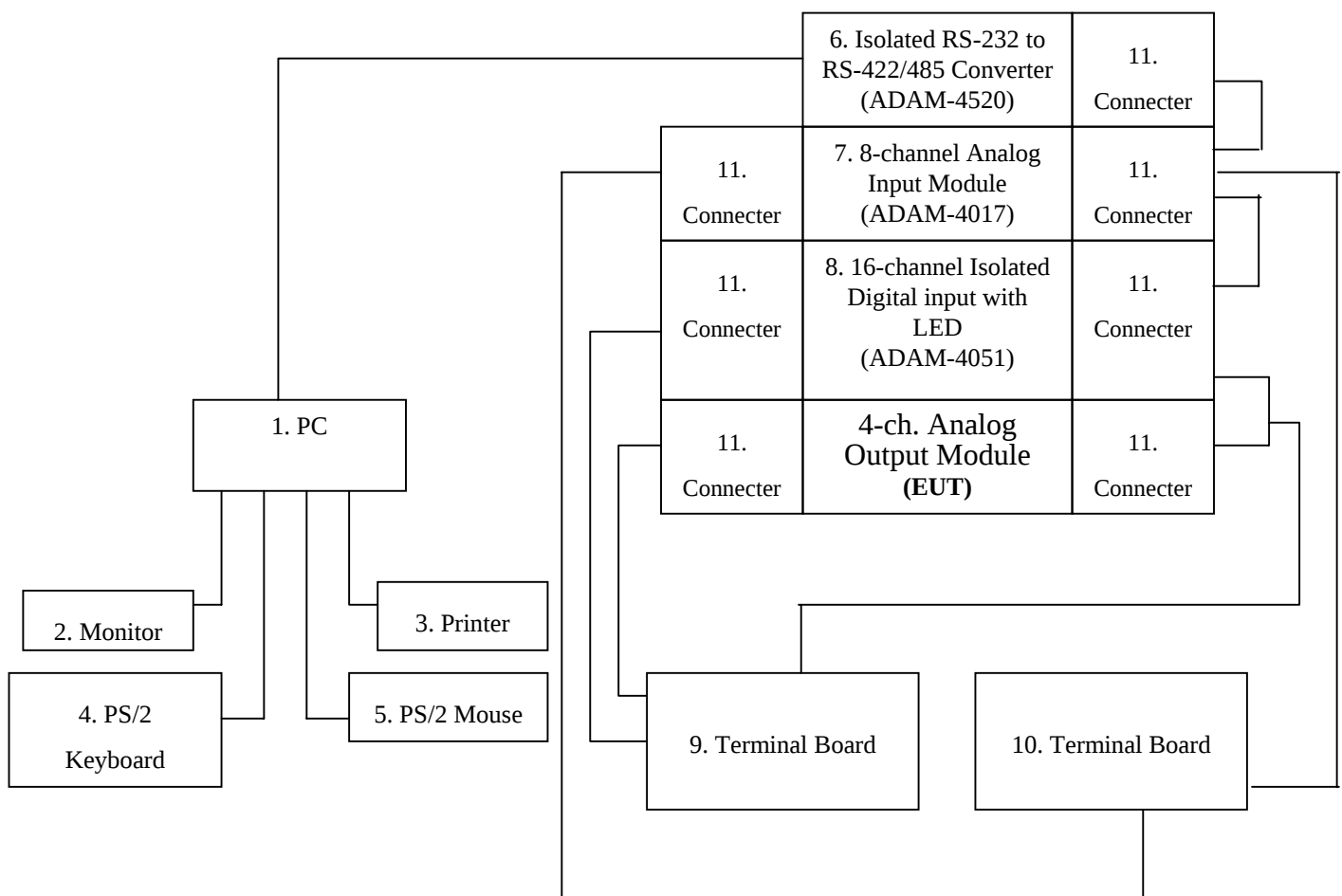
### System Diagram of Connections between EUT and Simulators

**EUT:** 4-ch. Analog Output Module

**Trade Name:** Advantech

**Model Number:** ADAM-4024

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



## **APPENDIX 1**

### **PHOTOGRAPHS (TEST SETUP OF LINE CONDUCTED EMISSION TEST)**

## LINE CONDUCTED EMISSION TEST

*Front View*



*Back View*



## **APPDENDIX 2**

### **PHOTOGRAPHS (TEST SETUP OF RADIATED EMISSION TEST)**

## RADIATED EMISSION TEST

*Front View*



*Back View*





## **APPENDIX 3**

### **PHOTOGRAPHS OF EUT**

*Front View of EUT*



*Back View of EUT*



*Left View of EUT*



*Right View of EUT*



*Top View of EUT*



*Bottom View of EUT*



*Front View of Power*



*Back View of Power*



*Left View of Power*



*Right View of Power*

