CE

SPORTON LAB.

Certificate No: C7N2703

# CERTIFICATE

Equipment Under Test : IPC

Model No. : AMB-6501

**Applicant : ASTECH Technology Co., Ltd.**

**6F-4, No. 351, Chung-Shan Rd., Sec. 2, Chung-Ho City, Taipei, Taiwan, R.O.C.**

SPORTON LAB.

I HEREBY **CERTIFY THAT:**

THE MEASUREMENTS SHOWN IN THIS TEST REPORT WERE MADE IN ACCORDANCE WITH THE PROCEDURES GIVEN IN **EUROPEAN COUNCIL DIRECTIVE 89/336/EEC.** THE EQUIPMENT WAS **PASSED** THE TEST PERFORMED ACCORDING TO

**EUROPEAN STANDARD EN 55022/A1 Class A, and**

**EN 50082-2 ( IEC 801-2, IEC 801-3, IEC 801-4 ).**

THE TEST WAS CARRIED OUT ON **Dec. 06, 1997** AT **SPORTON INTERNATIONAL INC.** LAB.

Lenore Chang Dec. 08, 1997

Lenore Chang

President

# CE TEST REPORT

according to

**European Standard EN 55022:1994/A1:1995 Class A and**
**EN 50082-2:1991 ( IEC 801-2:1984, IEC 801-3:1984, IEC 801-4:1988 )**

EQUIPMENT : IPC

MODEL NO. : AMB-6501

APPLICANT : **ASTECH Technology Co., Ltd.**
6F-4, No. 351, Chung-Shan Rd., Sec. 2, Chung-Ho City,
Taipei, Taiwan, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without the written authorization of the test lab., the Test Report may not be copied.

***SPORTON INTERNATIONAL INC.***

*6F, No. 106, Hsin Tai Wu Rd., Sec. 1, Hsi Chih, Taipei Hsien, Taiwan, R.O.C.*

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CERTIFICATE NO. : C7N2703

# CERTIFICATE OF COMPLIANCE

according to

**European Standard EN 55022:1994/A1:1995 Class A and**
**EN 50082-2:1991 ( IEC 801-2:1984, IEC 801-3:1984, IEC 801-4:1988 )**

EQUIPMENT : IPC

MODEL NO. : AMB-6501

APPLICANT : **ASTECH Technology Co., Ltd.**
6F-4, No. 351, Chung-Shan Rd., Sec. 2, Chung-Ho City,
Taipei, Taiwan, R.O.C.

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **EUROPEAN COUNCIL DIRECTIVE 89/336/EEC.** The equipment was ***passed*** the test performed according to **EUROPEAN STANDARD EN 55022:1994/A1:1995 Class A,** and **EN 50082-2:1991 (IEC 801-2:1984, IEC 801-3:1984, IEC 801-4:1988).**
The test was carried out on **Dec. 06, 1997** at **SPORTON INTERNATIONAL INC.** LAB.

Lenore C Y Dec. 08, 1997

Lenore Chang
President

三上科技 文管中心 87. 1.-1 發行章

***SPORTON INTERNATIONAL INC.***

*6F, No. 106, Hsin Tai Wu Rd., Sec. 1, Hsi Chih, Taipei Hsien, Taiwan, R.O.C.*

# 1. GENERAL DESCRIPTION OF EQUIPMENT UNDER TEST

## 1.1. APPLICANT : ASTECH Technology Co., Ltd.

6F-4, No. 351, Chung-Shan Rd., Sec. 2, Chung-Ho City,
Taipei, Taiwan, R.O.C.

## 1.2. MANUFACTURER : Same as 1.1.

## 1.3. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

EQUIPMENT : IPC
MODEL NO. : AMB-6501
TRADE NAME : ASTECH
DATA CABLE : Shielded
POWER SUPPLY TYPE : Switching
POWER CORD : Non-shielded

## 1.4. FEATURE OF EQUIPMENT UNDER TEST

- NEMA 4/12 painted aluminum front panel and painted metal steel chassis.
- 13.8" color TFT(XGA) or 13.8" color D_STN(XGA) or 14.2" color D_STN(SVGA) LCD display.
- Two sealed membrane keypads : 59 data keys and 24 function keys.
- Universal 250W switching power supply (or other options).
- MBC-266 Flat-panel control card.
- PSC - 6 ×86 All-in-one CPU card (with P-133 CPU, 16MB DRAM)

# 2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

## 2.1. TEST MANNER

a. The DELL keyboard, SONY monitor, TAICOM modem, HP mouse, GENIUS mouse and HP printer were connected to the EUT for EMI test. During testing, the interface cables and equipment positions were varied according to European Standard EN 55022.

b. The DELL keyboard, HP monitor, TAICOM modem, HP mouse, GENIUS mouse and HP printer were connected to the EUT for EMS test.

## 2.2. DESCRIPTION OF TEST SYSTEM

SUPPORT UNIT 1. -- MONITOR (HP)

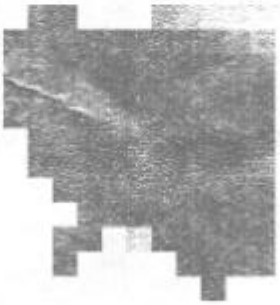
| | |
|---|---|
| Model No. | : D2807A |
| Power Supply Type | : Switching |
| Data Cable | : Shielded |

SUPPORT UNIT 2. -- PRINTER (HP)

| | |
|---|---|
| Model No. | : 2225C |
| Power Supply Type | : Linear, AC Adapter |
| Data Cable | : Shielded |

SUPPORT UNIT 3. -- KEYBOARD (DELL)

| | |
|---|---|
| Model No. | : AT101 |
| Data Cable | : Shielded |



SUPPORT UNIT 4. -- MODEM (TAICOM)

| | |
|---|---|
| Model No. | : MR34S |
| Power Supply Type | : Linear |
| Data Cable | : Shielded |

SUPPORT UNIT 5. --MONITOR (SONY)

| | |
|---|---|
| Model No. | : EDM-17SET2 |
| Data Cable | : Shielded |

SUPPORT UNIT 6. --MOUSE (HP)

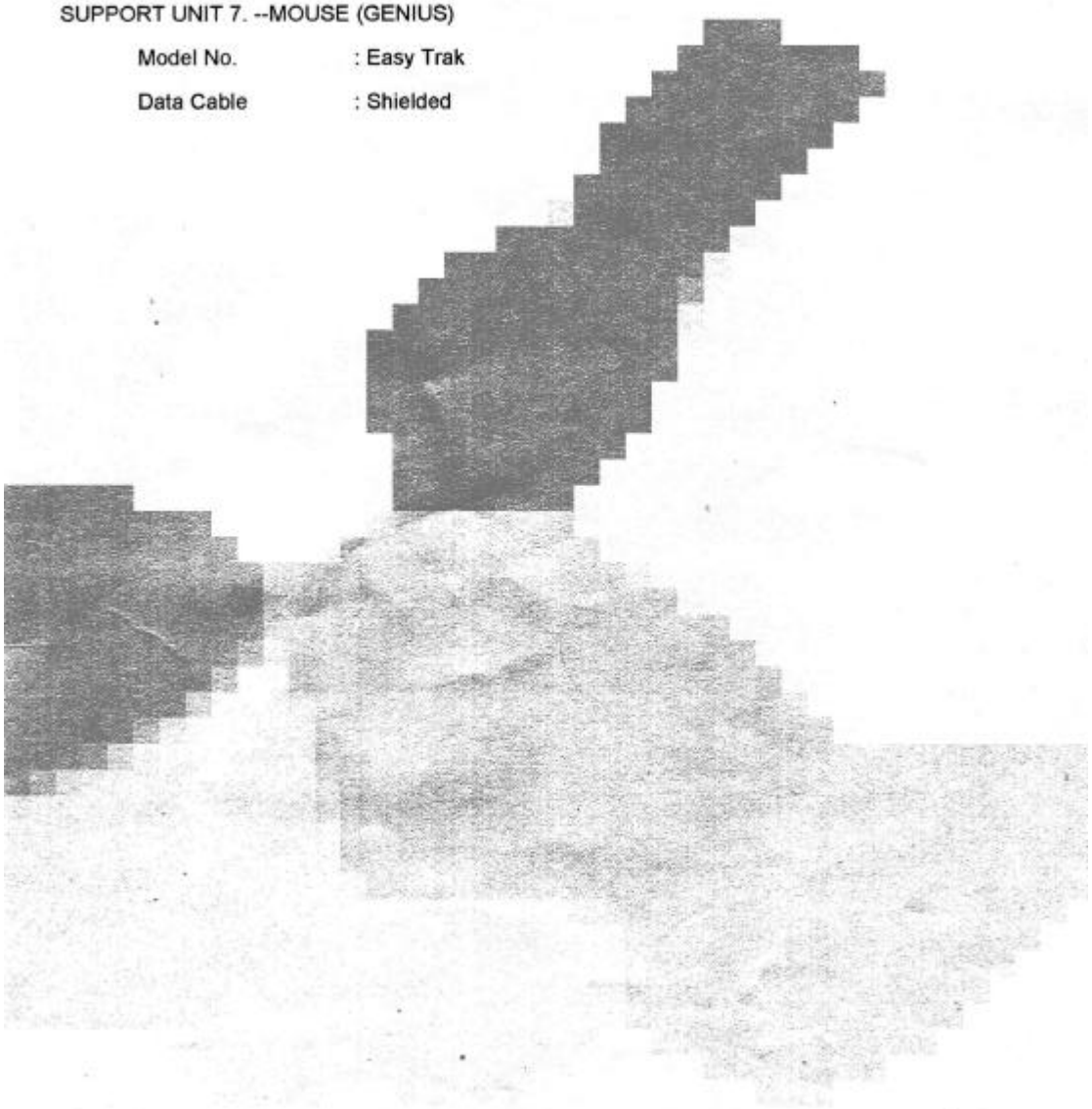
Model No. : M-S34

Data Cable : Shielded

SUPPORT UNIT 7. --MOUSE (GENIUS)

Model No. : Easy Trak

Data Cable : Shielded

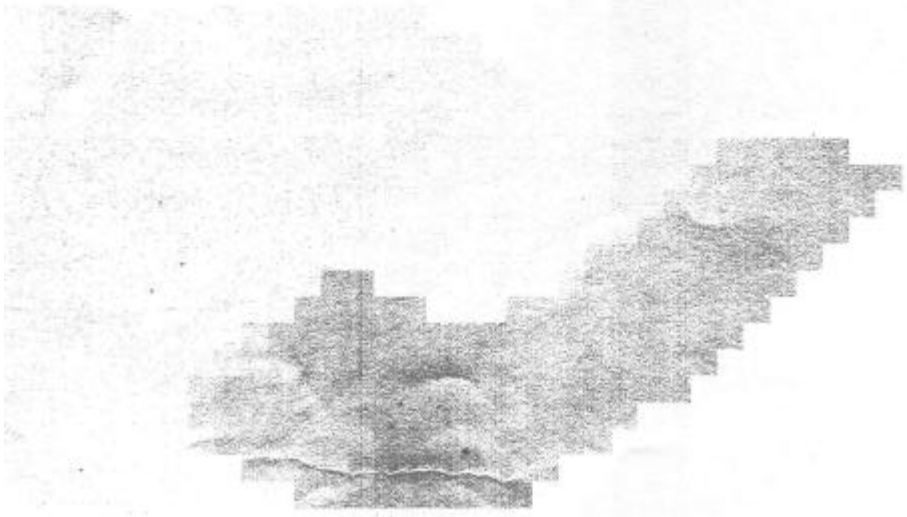


## 3. TEST SOFTWARE

An executive program, EMITEST.EXE, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

a. Turn on the power of all equipment.
b. The PC reads the test program from the floppy disk drive and runs it.
c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
e. The PC sends " H " messages to the modem.
f. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
g. Repeat the steps from b to f.



# 4. GENERAL INFORMATION OF TEST

## 4.1. TEST FACILITY

This test was carried out by SPORTON INTERNATIONAL INC.

Test Site Location : No. 30-1, Lin 6, Diing-Fwu Tsuen, Lin-Kou-Hsiang, Taipei Hsien, Taiwan, R.O.C.

TEL : 886-2-601-1640

FAX : 886-2-601-1695

## 4.2. STANDARD FOR METHODS OF MEASUREMENT

EMI Test ( conduction and radiation ) : European Standard EN 55022 Class A.

EMS Test ( ESD, RS and EFT ) : European Standard EN 50082-2.

## 4.3 .TEST IN COMPLIANCE WITH

EMI Test ( conduction and radiation ) : European Standard EN 55022 Class A.

EMS Test ( ESD, RS and EFT ) : European Standard EN 50082-2.

( ESD : IEC 801-2, RS : IEC 801-3, EFT : IEC 801-4 )

## 4.4. FREQUENCY RANGE INVESTIGATED

a. Conducted emission test: from 150 KHz to 30 MHz

b. Radiated emission test: from 30 MHz to 1000 MHz

c. Radio frequency electromagnetic field immunity test : from 27 MHz to 500 MHz.

## 4.5. TEST DISTANCE

The test distance of radiated emission test from antenna to EUT is 10 M.

The test distance of radio frequency electromagnetic field immunity test from antenna to EUT is 3 M.

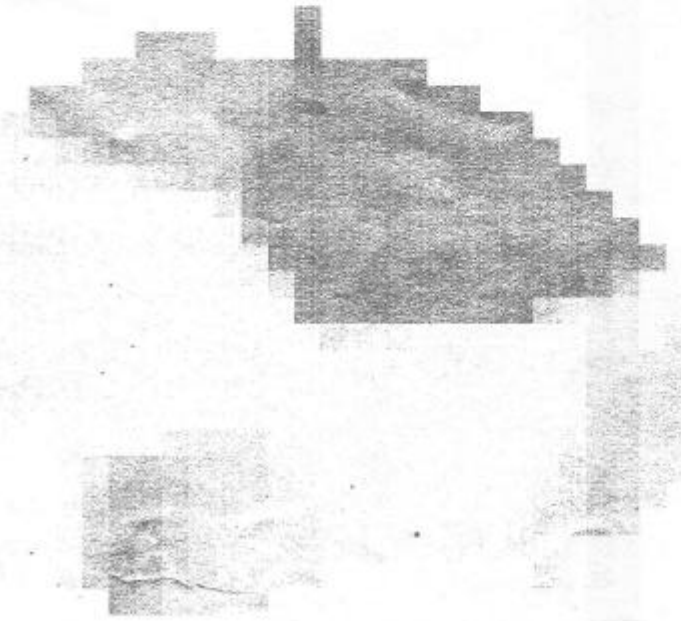
# 5. TEST OF CONDUCTED POWERLINE

Conducted Emissions were measured from 150 KHz to 30 MHz with a bandwidth of 9 KHz on the 230 VAC power and return leads of the EUT according to the methods defined in European Standard EN 55022 Clause 9. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in Figure 5-3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

## 5.1. DESCRIPTION OF MAJOR TEST INSTRUMENTS

- Test Receiver ( HP 85462A )

| | |
|---|---|
| Attenuation | 0 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| Step MHz | 0.007 MHz |
| IF Bandwidth | 9 KHz |



## 5.2. TEST PROCEDURES

a. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.

b. Connect EUT to the power mains through a line impedance stabilization network ( LISN ).

c. All the support units are connect to the other LISN.

d. The LISN provides 50 ohm coupling impedance for the measuring instrument.

e. The CISPR states that a 50 ohm , 50 microhenry LISN should be used.

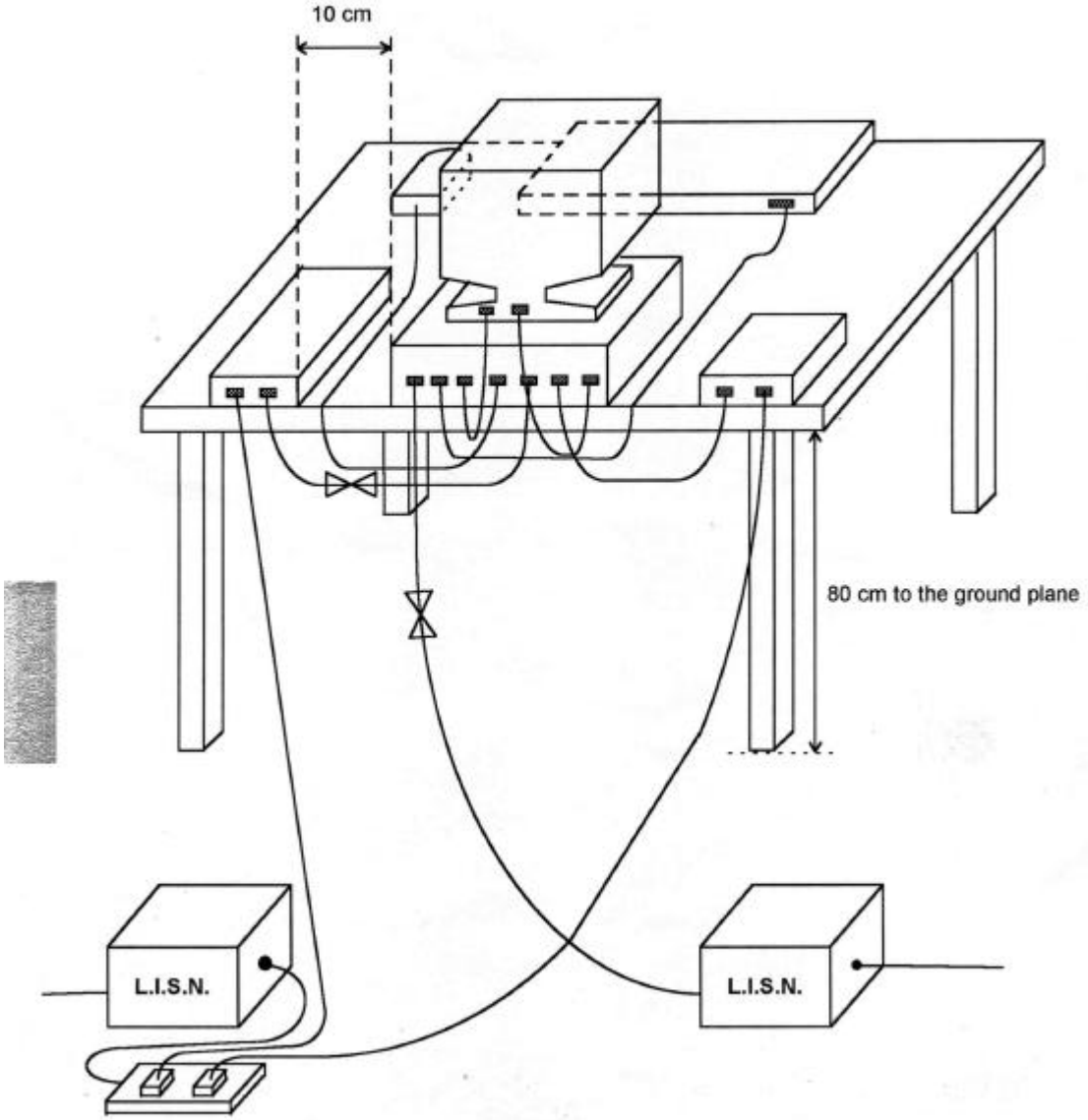
f. Both sides of AC line were checked for maximum conducted interference.

g. The frequency range from 150 KHz to 30 MHz was searched.

h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

i. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be retested one by one using the quasi-peak method and/or average methods and reported.

## 5.3. TYPICAL TEST SETUP LAYOUT OF CONDUCTED POWERLINE



## 5.4. TEST RESULT OF AC POWERLINE CONDUCTED EMISSION

- Equipment meets the technical specifications of EN 55022 ( 1994 )
- Frequency Range of Test : from 0.15 MHz to 30 MHz
- Temperature : 26 ℃
- Relative Humidity : 63% RH
- Test Mode : Normal Mode
- Test Date : Dec. 06, 1997

**The Conducted Emission test was passed at Neutral 8.01 MHz / 58.80 dBuV.**

| Frequency | Line | Meter Reading | | | | Limits | | | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | or | Q.P. | A.V. | Q.P. | A.V. | Q.P. | A.V. | Q.P. | A.V. | Q.P. | A.V. |
| ( MHz ) | Neutral | ( dBuV ) | ( dBuV ) | ( uV ) | ( uV ) | ( dBuV ) | ( dBuV ) | ( uV ) | ( uV ) | ( dB ) | ( dB ) |
| 0.18 | L | 46.20 | 32.20 | 204.17 | 40.74 | 79.00 | 66.00 | 8912.51 | 1995.26 | -32.80 | -33.80 |
| 4.02 | L | 49.90 | 36.20 | 312.61 | 64.57 | 79.00 | 66.00 | 8912.51 | 1995.26 | -29.10 | -29.80 |
| 8.01 | L | 58.70 | 53.50 | 860.99 | 473.15 | 79.00 | 66.00 | 8912.51 | 1995.26 | -20.30 | -12.50 |
| 0.18 | N | 45.70 | 31.70 | 192.75 | 38.46 | 79.00 | 66.00 | 8912.51 | 1995.26 | -33.30 | -34.30 |
| 4.02 | N | 50.00 | 36.30 | 316.23 | 65.31 | 79.00 | 66.00 | 8912.51 | 1995.26 | -29.00 | -29.70 |
| 8.01 | N | 58.80 | 53.70 | 870.96 | 484.17 | 79.00 | 66.00 | 8912.51 | 1995.26 | -20.20 | -12.30 |

Test Engineer: C. W. Lo

# 6. TEST OF RADIATED EMISSION

Radiated emissions from 30 MHz to 1000 MHz were measured with a bandwidth of 120 KHz according to the methods defines in European Standard EN 55022, Clause 10. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in Figure 6-3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

## 6.1. DESCRIPTION OF MAJOR TEST INSTRUMENTS

- Spectrum Analyzer

| | |
|---|---|
| Attenuation | 0 dB |
| Start Frequency | 30 MHz |
| Stop Frequency | 1000 MHz |
| Resolution Bandwidth | 100 KHz |
| Video Bandwidth | 300 KHz |
| Signal Input | 50 ohm, 50 VDC MAX., +30 dBm MAX. |

- Quasi-Peak Adapter

| | |
|---|---|
| Resolution Bandwidth | 1 MHz |
| Frequency Band | 120 KHz |
| Quasi-Peak Detector | 1 ms/MHz (OFF), 20s/MHz (ON) |

## 6.2. TEST PROCEDURES

a. The EUT was placed on a rotatable table top 0.8 meter above ground.

b. The EUT was set 10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.

c. The table was rotated 360 degrees to determine the position of the highest radiation.

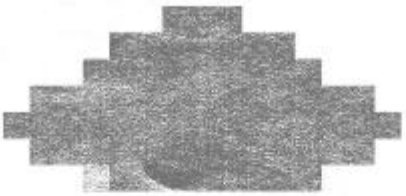
d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.

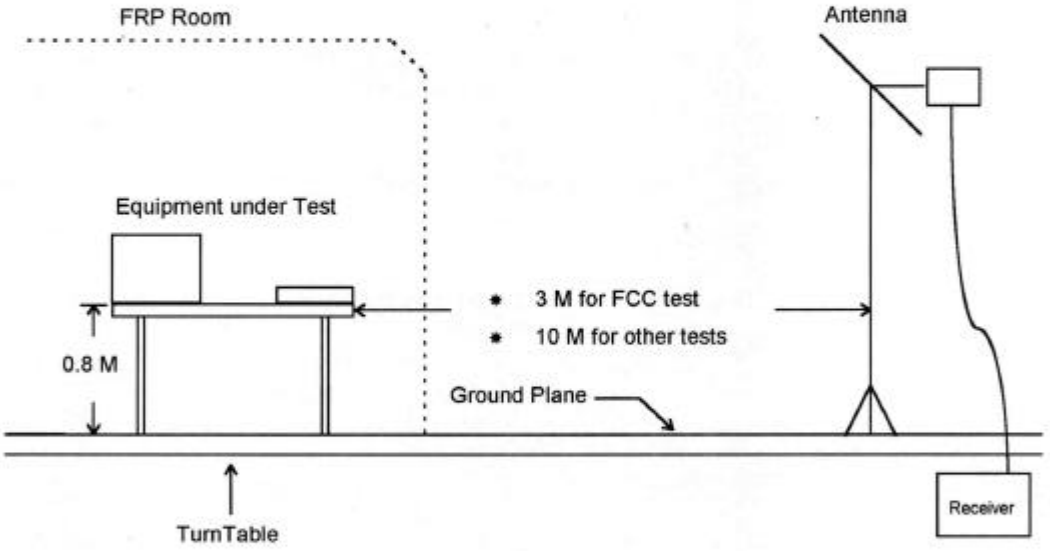
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower ( from 1 M to 4 M ) and turn table ( from 0 degree to 360 degrees ) to find the maximum reading.

f. Set the test-receiver system ( HP 8568B ) to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be repeated one by one using the quasi-peak method and reported.

## 6.3. TYPICAL TEST SETUP LAYOUT OF RADIATED EMISSION





## 6.4. TEST RESULT OF RADIATED EMISSION

- Equipment meets the technical specifications of EN 55022 ( 1994 )
- Frequency Range of Test : from 30 MHz to 1000 MHz
- Test Distance : 10 M
- Temperature : 29 ℃
- Relative Humidity : 61% RH
- Test Mode : Normal Mode
- Test Date : Dec. 06, 1997

- Emission level ( dBuV/m ) = 20 log Emission level ( uV/m )
- Sample Calculation at 120.44 MHz
  Corrected Reading = 11.77 + 1.82 + 23.09 = 36.69 (dBuV/m )

**The Radiated Emission test was passed at**

**Vertical 215.5 MHz / 38.48 dBuV ,**

**Antenna Height 1 Meter , Turntable Degree 180 °.**

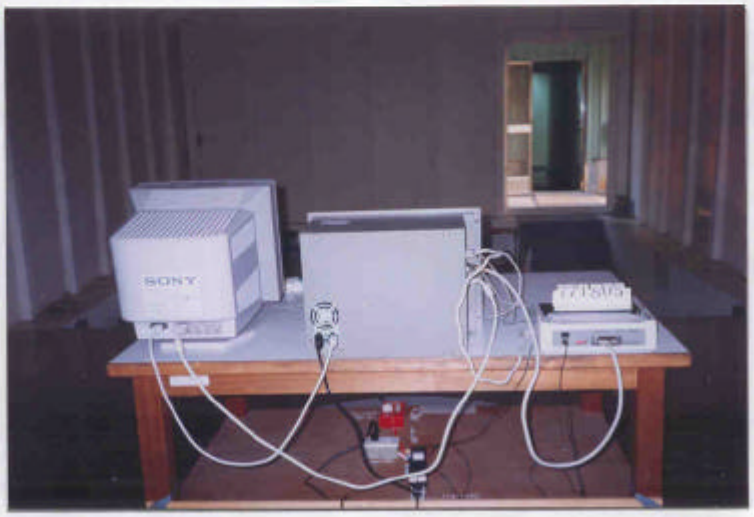
| Frequency ( MHz ) | Polarity | Antenna Factor (dB/m) | Cable Loss ( dB ) | Reading ( dBuV ) | Reading (dBuV/m) | Limits (uV/m) | Emission (dBuV/m) | Level (uV/m) | Margin ( dB ) |
|---|---|---|---|---|---|---|---|---|---|
| 120.44 | H | 11.77 | 1.82 | 23.09 | 40.00 | 100 | 36.69 | 68.31 | -3.31 |
| 120.44 | V | 11.77 | 1.82 | 22.49 | 40.00 | 100 | 36.09 | 63.75 | -3.91 |
| 128.26 | V | 11.30 | 2.21 | 22.60 | 40.00 | 100 | 36.12 | 63.97 | -3.88 |
| 160.56 | V | 10.46 | 2.10 | 23.21 | 40.00 | 100 | 35.77 | 61.45 | -4.23 |
| 215.50 | V | 9.35 | 2.42 | 26.71 | 40.00 | 100 | 38.48 | 83.95 | -1.52 |
| 225.50 | V | 9.55 | 2.50 | 24.80 | 40.00 | 100 | 36.85 | 69.58 | -3.15 |

Test Engineer : mark chen

## 6.5. PHOTOGRAPHS OF RADIATED EMISSION TEST CONFIGURATION

FRONT VIEW

REAR VIEW

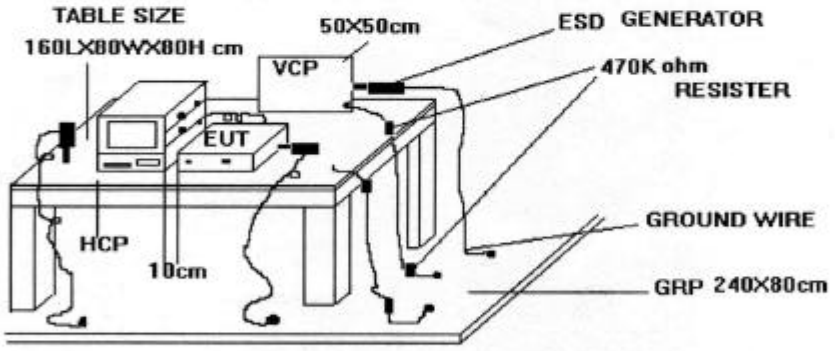


# 7. ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

## FINAL TEST RESULT : PASS

- Basic Standard : IEC 801-2 ( 1984 )
- Generic Standard : EN 50 082-2 ( 1991 )
- Performance Criteria : B
- Level : 3 for Air discharge,
  2 for Contact discharge
- Tested Voltage : ± 2 / ± 4 / ± 8 KV for Air discharge,
  ± 2 / ± 4 KV for Contact discharge
- Temperature : 24 ℃
- Relative Humidity : 52 %
- Test Date : Dec. 06, 1997

## 7.1. TEST SETUP



The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform DIRECT and INDIRECT application of discharges to the EUT as applicable, in the follow manner :

(a) CONTACT DISCHARGE to the conductive surfaces and to coupling plane;

(b) AIR DISCHARGE at insulating surfaces.

The preferred test method is that of type tests performed in laboratories and the only accepted method of demonstrating conformance with this standard. The EUT was arranged as closely as possible to arrangement in final installed conditions.

## 7.2. TEST SETUP FOR TESTS PERFORMED IN LABORATORY

A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm ,minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the SPORTON EMC LAB. we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.

The EUT was arranged and connected according to its functional requirements. A distance of 1m minimum was provided between the EUT and the wall of the lab. and any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall , where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2m to other conductive parts in the test setup.

Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k ohm resister located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.

## 7.3. ESD TEST PROCEDURE

a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
   - ambient temperature : 15 ℃ to 35 ℃;
   - relative humidity : 30 % to 60 %;
   - atmospheric pressure : 68 KPa (680 mbar) to 106 KPa (1060 mbar).

b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.

c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.

d. The test shall be performed with single discharges. On preselected points at least ten single discharges ( in the most sensitive polarity) shall be applied.

e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted :
   - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
   - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
   - The contact discharge test shall not be applied to such surfaces.

h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT . After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

## 7.4. TEST SEVERITY LEVELS

### 7.4.1. Contact discharge

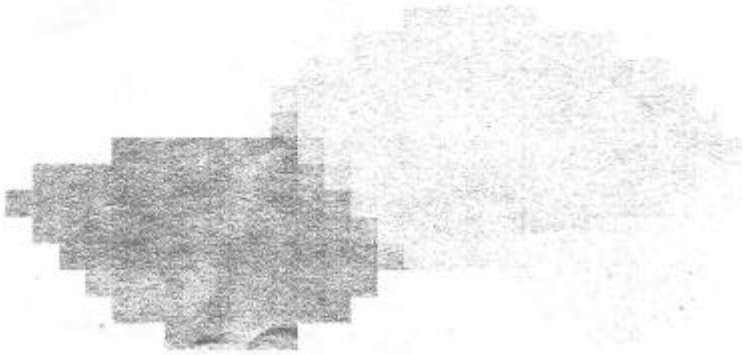
| Level | Test Voltage (KV) of Contact discharge |
|---|---|
| 1 | ±2 |
| 2 | ±4 |
| 3 | ±6 |
| 4 | ±8 |
| X | Specified |

Remark : "X" is an open level.

### 7.4.2. Air discharge

| Level | Test Voltage (KV) of Air Discharge |
|---|---|
| 1 | ±2 |
| 2 | ±4 |
| 3 | ±8 |
| 4 | ±15 |
| X | Specified |

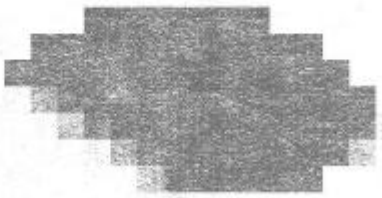
Remark : "X" is an open level.



## 7.5. TEST POINTS

### 7.5.1. TEST RESULT OF AIR DISCHARGE

| TEST POINT | VOLTAGE | TESTED NO. | OBSERVATION | RESULT |
|---|---|---|---|---|
| CASE | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| SCREW | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| BRACKET | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| VGA PORT | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| PRINTER PORT | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| COM1 PORT | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| COM2 PORT | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| LED | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| AC SOCKET | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| POWER SWITCH | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| KEYBOARD CONNECTOR | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| INTERNAL KEYBOARD | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| 3 1/2" F.D.D. | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |
| BRIGHTNESS CONTROLLER | ±2 / ±4 / ±8 KV | BY 10 | NORMAL | *PASS* |



### 7.5.2. TEST RESULT OF CONTACT DISCHARGE

| POLARITY | VOLTAGE | TESTED NO. | OBSERVATION | RESULT |
|---|---|---|---|---|
| HORIZONTAL(AT FRONT) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| HORIZONTAL (AT LEFT) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| HORIZONTAL (AT RIGHT) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| HORIZONTAL (AT REAR) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| VERTICAL (AT FRONT) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| VERTICAL (AT LEFT) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| VERTICAL (AT RIGHT) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| VERTICAL (AT REAR) | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| CASE | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| SCREW | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| BRACKET | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| VGA PORT | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| PRINTER PORT | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| COM1 PORT | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| COM2 PORT | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| KEYBOARD CONNECTOR | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |
| BRIGHTNESS CONTROLLER | ±2 / ±4 KV | BY 10 | NORMAL | *PASS* |

Test Engineer : C. W. Lee

## 7.6. PHOTOGRAPHS OF ELECTROSTATIC DISCHARGE IMMUNITY TEST

FRONT VIEW

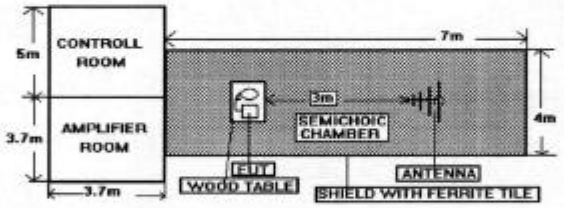

REAR VIEW

# 8. RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

## FINAL TEST RESULT : PASS

- Basic Standard : IEC 801-3 ( 1984 )
- Generic Standard : EN 50 082-2 ( 1991 )
- Performance Criteria : A
- Level : 3
- Frequency Range : 27 to 500 MHz
- Field Strength : 10V/m
- Temperature : 25 ℃
- Relative Humidity : 57 %
- Test Date : Dec. 06, 1997

### 8.1. TEST SETUP




**NOTE : The SPORTON 7m x 4m x 4m semichoic chamber is compliance with the sixteen points uniform field requirement as stated in IEC 1000-4-3 Section 6.2**

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semichoic chamber.

## 8.2. TEST PROCEDURE

a. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.

b. The bilog antenna which is enabling the complete frequency range of 27 MHz to 500 MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.

c. The test is normally performed with the antenna facing the most sensitive side of the EUT. The polarization of the field generated by the biconical antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. The circular polarization of the field from the log-spiral antenna makes a change of position of the antenna unnecessary.

d. At each of the above conditions, the frequency range is swept from 27 MHz to 500 MHz, pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of $1.5 * 10^{-3}$ decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

## 8.3. TEST SEVERITY LEVELS

Frequency Band : 27 MHz to 500 MHz

| Level | Test field strength (V/m) |
|---|---|
| 1 | 1 |
| 2 | 3 |
| 3 | 10 |
| X | Specified |

Remark : "X" is an open class.

Test Engineer : C. W. Lee

## 8.4. PHOTO OF RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

FRONT VIEW

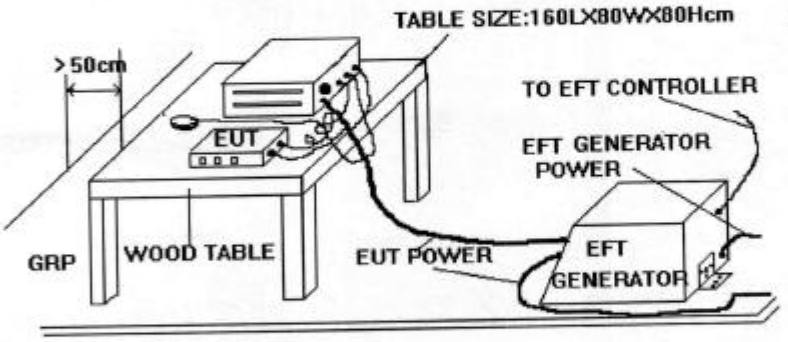
REAR VIEW

# 9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT/BURST)

## FINAL TEST RESULT : PASS

- Basic Standard : IEC 801-4 ( 1988 )
- Generic Standard : EN 50 082-2 ( 1991)
- Performance Criteria : B
- Level : on Power Supply -- 3
- Test Voltage : on Power Supply -- ± 0.5 / 1.0 / 2.0 KV
- Temperature : 25 ℃
- Relative Humidity : 57 %
- Test Date : Dec. 06, 1997

## 9.1. TEST SETUP



The EUT was placed on a ground reference plane and was insulated from it by an insulating support about 0.1m thick. If the EUT is table-top equipment, it was located approximately 0.8m above the GRP.. The GRP. was a metallic sheet (copper or aluminum) of 0.25 mm ,minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. It shall project beyond the EUT by at least 0.1m on all sides and connected to the protective earth. In the SPORTON EMC LAB. we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system. The EUT was arranged and connected according to its functional requirements. The minimum distance between the EUT and other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. Using the coupling clamp, the minimum distance between the coupling plates and all other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. The length of the signal and power lines between the coupling device and the EUT was 1m or less.

## 9.2. TEST ON POWER LINE

a. The EFT/B-generator was located on the GRP.. The length from the EFT/B-generator to the EUT as not exceed 1 m.
b. The EFT/B-generator provides the ability to apply the test voltage in a non-symmetrical condition to the power supply input terminals of the EUT.

## 9.3. TEST ON COMMUNICATION LINES

a. The coupling clamp is composed of a clamp unit for housing the cable (length more than 3 m), and was placed on the GRP..
b. The coupling clamp provides the ability of coupling the fast transient/bursts to the cable under test.

## 9.4. TEST PROCEDURE

a. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements :
- ambient temperature : 15℃ to 35℃;
- relative humidity : 45% to 75%;
- atmospheric pressure : 68 KPa (680 mbar) to 106 KPa (1060 mbar ).

b. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.

c. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.

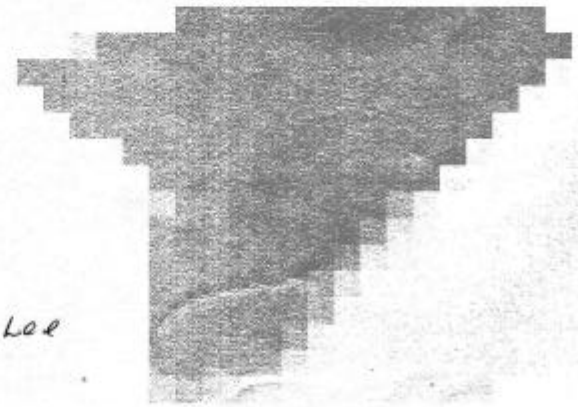
d. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :
- Normal performance within the specification limits.
- Temporary degradation or loss of function or performance which is selfrecoverable.
- Temporary degradation or loss of function or performance which requires operator intervention or system reset.
- Degradation or loss of function which is not recoverable due to damage of equipment (components).

## 9.5. TEST SEVERITY LEVELS

The following test severity levels are recommended for the fast transient/burst test :

| Open circuit output test voltage ± 10% | | |
|---|---|---|
| Level | On Power Supply | On I/O signal, data and control line |
| 1 | 0.5 KV | 0.25 KV |
| 2 | 1.0 KV | 0.50 KV |
| 3 | 2.0 KV | 1.00 KV |
| 4 | 4.0 KV | 2.00 KV |
| X | Specified | Specified |

Remark : " X " is an open level. The level is subject to negotiation between the user and the manufacturer or is specified by the manufacturer.



Test Engineer : C. W. Lee

## 9.6. PHOTO OF ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

FRONT VIEW

REAR VIEW

## 10. PHOTOGRAPHS OF EUT APPEARANCE

## 11. ANTENNA FACTOR & CABLE LOSS

| Frequency ( Mhz ) | Antenna Factor ( dB ) | Cable Loss ( dB ) |
|---|---|---|
| 30 | 17.7 | 0.9 |
| 35 | 15.6 | 1.1 |
| 40 | 13.0 | 1.0 |
| 45 | 10.1 | 1.2 |
| 50 | 8.0 | 1.2 |
| 55 | 6.4 | 1.2 |
| 60 | 6.1 | 1.2 |
| 65 | 5.9 | 1.4 |
| 70 | 6.4 | 1.3 |
| 75 | 6.3 | 1.5 |
| 80 | 7.2 | 1.5 |
| 85 | 7.5 | 1.6 |
| 90 | 8.5 | 1.6 |
| 100 | 10.1 | 1.7 |
| 110 | 10.4 | 1.9 |
| 120 | 11.8 | 1.8 |
| 130 | 11.2 | 2.3 |
| 140 | 11.7 | 2.0 |
| 150 | 11.9 | 2.2 |
| 160 | 10.5 | 2.1 |
| 180 | 9.0 | 2.0 |
| 200 | 9.1 | 2.3 |
| 225 | 9.5 | 2.5 |
| 250 | 11.8 | 2.6 |
| 300 | 13.6 | 2.9 |
| 350 | 14.8 | 3.1 |
| 400 | 16.3 | 3.4 |
| 450 | 17.3 | 3.7 |
| 500 | 17.7 | 3.7 |
| 550 | 19.5 | 3.9 |
| 600 | 20.0 | 4.1 |
| 650 | 20.4 | 4.3 |
| 700 | 21.0 | 4.6 |
| 750 | 21.4 | 4.9 |
| 800 | 22.1 | 4.8 |
| 850 | 22.9 | 5.0 |
| 900 | 22.7 | 5.1 |
| 950 | 24.1 | 5.3 |
| 1000 | 24.9 | 5.5 |

## 12. LIST OF MEASURING EQUIPMENT USED

| Instrument | Manufacturer | Model | Characteristics | Calibration Date | Used for |
|---|---|---|---|---|---|
| ESD Simulator | KEYTEK | MZ-15/EC | 0 KV - 25 KV | Sep. 10, 1997 | ESD |
| OMNI-Tip | KEYTEK | TPC-2 | 0 KV - 15 KV | Jul. 24, 1997 | ESD |
| Amplifier | AR | 100W 1000M3 | 80 MHz - 1 GHz | N/A | RS |
| Isotropic Field Probe | AR | FP3000A | 10 KHz - 1 GHz | Jun. 20, 1997 | RS |
| IEEE-488 Interface | AR | CP3000 | N/A | N/A | RS |
| System Interface | EMC Automation | 200 | HP-IB INTERFACE | N/A | RS |
| Power Meter | EMC Automation | 438A | 100 KHz -4.2 GHz | N/A | RS |
| Video Camera controller | EMC Automation | VCC-01 | N/A | N/A | RS |
| Signal Generator | HP | 8648A | 100 KHz - 1 GHz | Sep. 11, 1997 | RS |
| Signal Generator | R&S | SMX | 100 KHz - 1 GHz | Sep. 11, 1997 | RS |
| Antenna | CHASE | CBL6121A | 26 MHz - 1 GHz | Jun. 13, 1997 | RS |
| Amplifier | AR | 75W 75A220 | 25MHz - 300MHz | Jun. 15, 1997 | RS |
| EFT Generator | KEYTEK | CE-40 | 0 KV - 4.4 KV | July 10, 1997 | EFT |

## 13. DECLARATION OF CONFORMITY AND THE CE MARK

There are three possible procedures pertaining to the declaration of conformity :

**13.1. Conformity testing and declaration of conformity by the manufacturer or his authorized representative established within the Community or by an importer.**

- Article 10 (1) of the EMC Directive,
- § 3 (1) no. 2a of the EMC Act.

**13.2. Declaration of conformity issued by the manufacturer or his authorized representative established within the Community or by an importer following testing of the product and issued of an *EC certificate of conformity by a competent body.***

- Article 10 (2) of the EMC Directive,
- § 3 (1) no. 2b of the EMC Act.

**13.3. Declaration of conformity issued by the manufacturer or his authorized representative established within the Community or by an importer following *testing and certification of the product by a notified body.***

- Article 10 (5) of the EMC Directive,
- § 3 (1) no. 2b of the EMC Act (radio transmitting installations).

### 13.4. Specimen For The CE Marking Of Electrical / Electronical Equipment

The components of the CE marking shall have substantially the same vertical dimension, which may not be less than 5 mm.