CE EMI TEST REPORT

according to

European Standard EN 55022:1994/A1:1995 Class A

Equipment : IPC

MODEL NO. : AMB-621

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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United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ISO/IEC GUIDE 25:1990
ISO 9002:1987

Certificate of Accreditation

SPORTON INTERNATIONAL, INC.
TAIPEI HSIEN
TAIWAN

is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS
FCC

December 31, 1998
Effective through

For the National Institute of Standards and Technology

NVLAP Lab Code: 200079-0

NVLAP-01C (11-96)

CERTIFICATE OF COMPLIANCE

according to

European Standard EN 55022:1994/A1:1995 Class A

Equipment : IPC

MODEL NO. : AMB-621

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

I **HEREBY** VERIFY 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 B.** The test was carried out on **FEB. 24, 1997** at **SPORTON INTERNATIONAL INC.** LAB in Lin Kou.

Lenore Chang Mar. 31, 1998

Lenore Chang
PRESIDENT

三上科技 文管中心 87. 3. 31 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-621
TRADE NAME : ASTECH
DATA CABLE: Shielded
Power Cord: Non-shielded
Power Supply Type: Switching

1.4. FEATURE OF EQUIPMENT UNDER TEST

- ISA-Bus (PC/AT compatible)
- 19" rack panel mounting
- 10.4" color TFT LCD display, color STN_DD LCD display
- 200-watt auto-range switching power supply
- Two sealed-membrane keypads: one with 59 data-entry keys and one with 20 function keys
- External monitor connector

2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

2.1. TEST MANNER

a. The DELL keyboard, HP monitor, TAICOM&DATATRONICS modems, KYE mouse and HP printer were connected to the ASTECH PC for EMI test. During testing, the interface cables and equipment positions were varied according to European Standard EN 55022.

2.2. DESCRIPTION OF TEST SYSTEM

SUPPORT UNIT 1. -- PRINTER (HEWLETT PACKARD)

Model No.	: DESKJET 400
Power Supply Type	: Linear, AC Adapter
Power Cord	: Non-shielded
Data Cable	: Shielded, 137 cm Length, Metallic connector

SUPPORT UNIT 2. -- KEYBOARD (DELL)

Model No.	: AT101
Data Cable	: Shielded, 132 cm Length, Metallic connector

SUPPORT UNIT 3. -- MODEM (TAICOM)

Model No.	: MR34SV
Power Supply Type	: Linear, AC Adapter
Power Cord	: Non-shielded
Data Cable	: Shielded

SUPPORT UNIT 4. -- MONITOR (HP)

Model No,.	:D2807A
Data Cable	:Shielded
Power Supply Type	:Switching
Power Cord	:Non-shielded

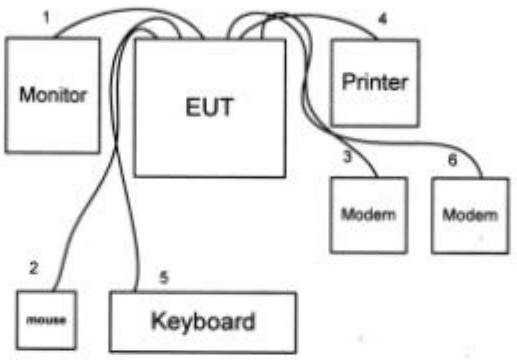
SUPPORT UNIT 5. --- MOUSE (KYE)

Model No.	:EASY TRACK
Data Cable	:Non-shielded

SUPPORT UNIT 6. -- MODEM (DATATRONICS)

Model No.	: 2400C
Power Supply Type	: Linear, AC Adapter
Power Cord	: Non-shielded
Data Cable	: Shielded

2.3. CONNECTION DIAGRAM OF TEST SYSTEM



1. The I/O cable is connected to the support device 4.
2. The I/O cable is connected to the support device 5.
3. The I/O cable is connected to the support device 6.
4. The I/O cable is connected to the support device 1.
5. The I/O cable is connected to the support device 2.
6. The I/O cable is connected to the support device 3.

3. TEST SOFTWARE

An executive program, FCC.EXE, which generates a complete line of continuously repeating " H " pattern is 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 reads "H" messages from the scanner.
d. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
e. The PC sends " H " messages to the printer, then the printer prints them on the paper.
f. The PC sends " H " messages to the modem.
g. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
h. Repeat the steps from b to g.

4. GENERAL INFORMATION OF TEST

4.1. TEST FACILITY

This test was carried out by SPORTON INTERNATIONAL INC.

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

TEL : 886-2-2601-1640

FAX : 886-2-2601-1695

4.2. STANDARD FOR METHODS OF MEASUREMENT

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

4.3 .TEST IN COMPLIANCE WITH

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

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

4.5. TEST DISTANCE

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

5. TEST OF CONDUCTED POWERLINE

Conducted Emissions were measured from 150 KHz to 30 MHz with a bandwidth of 9 KHz on the 230VAC 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 section 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	HP85462A
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.

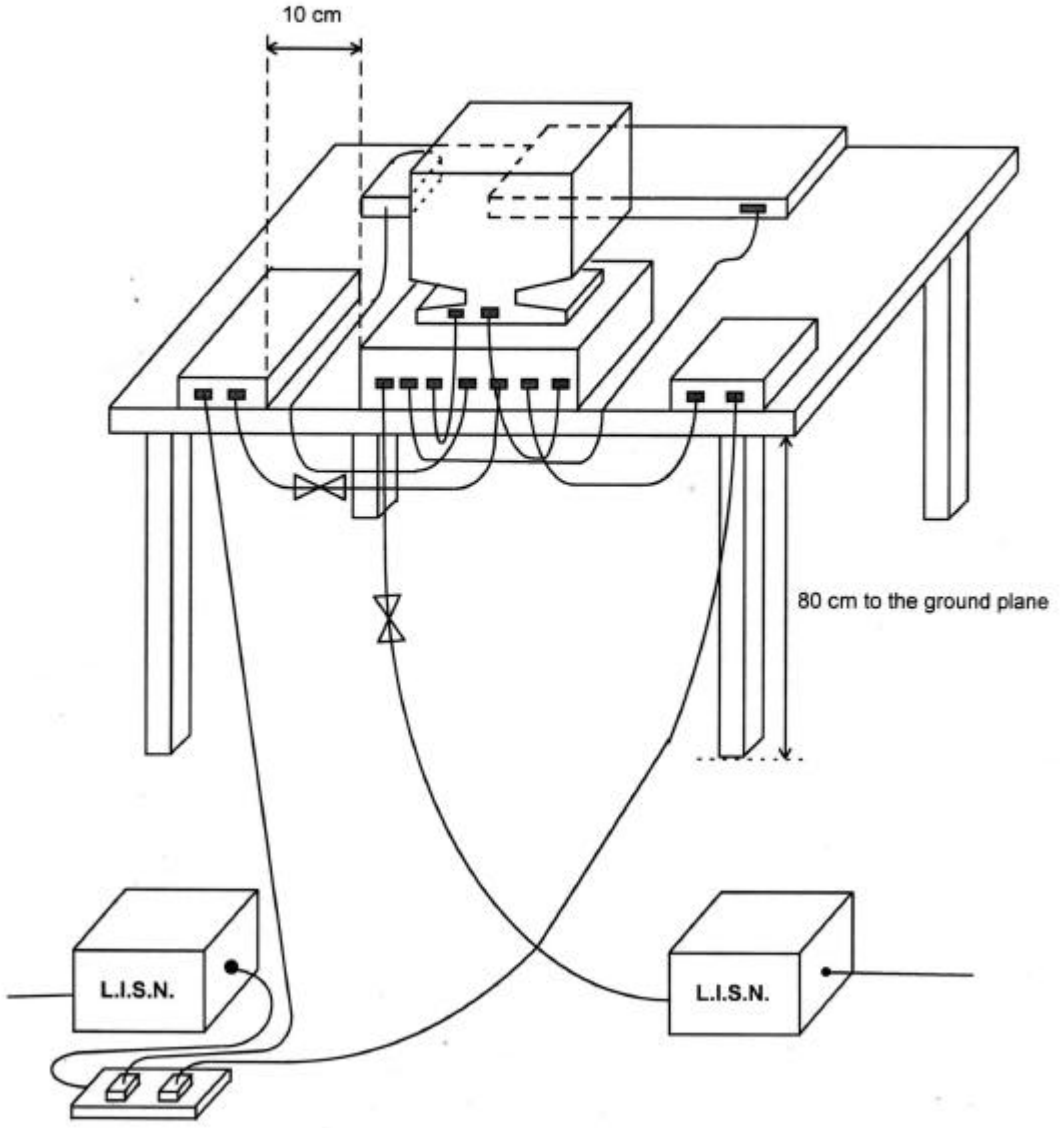
f. Both sides of AC line were checked for maximum conducted interference.

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 : 19 ℃
- Relative Humidity : 65% RH
- Test Date : FEB. 24, 1997

The Conducted Emission test of was passed at minimum margin

NATURE 24.80MHz / 53.40dBuV.

Frequency	LINE	Meter Reading				Limits				Margin	
(MHz)	or NEUTRAL	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
23.15	L	50.40	43.50	331.13	149.62	73.00	60.00	4466.84	1000.00	-22.60	-16.50
20.12	L	34.50	31.20	53.09	36.31	73.00	60.00	4466.84	1000.00	-38.50	-28.80
3.26	L	36.20	31.90	64.57	39.36	73.00	60.00	4466.84	1000.00	-36.80	-28.10
0.81	N	50.20	42.60	323.59	134.90	79.00	66.00	8912.51	1995.26	-28.80	-23.40
2.16	N	45.20	41.10	181.97	113.50	79.00	60.00	8912.51	1000.00	-33.80	-18.90
24.80	N	53.40	46.20	467.74	204.17	73.00	60.00	4466.84	1000.00	-19.60	-13.80

Test Engineer: Jack Dey

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 section 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.

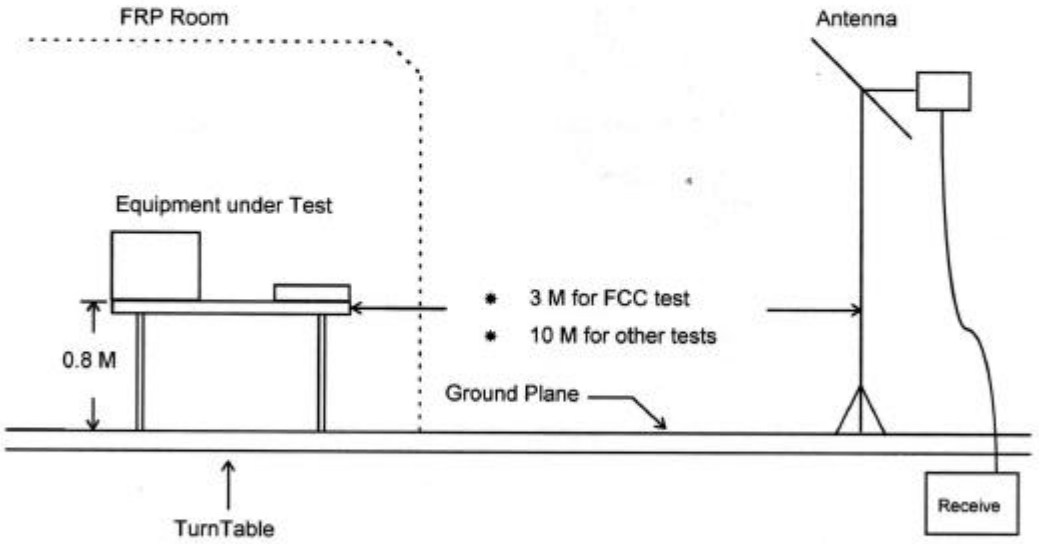
d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.

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 : 19 ℃
- Relative Humidity :65% RH
- Test Date : FEB. 24, 1997
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Sample Calculation at 182.66MHz
  Corrected Reading = 9.01+ 2.04+ 18.46= 29.51(dBuV/m)

The Radiated Emission test was passed at minimun margin

Vertical 33.23MHz / 33.13dBuV

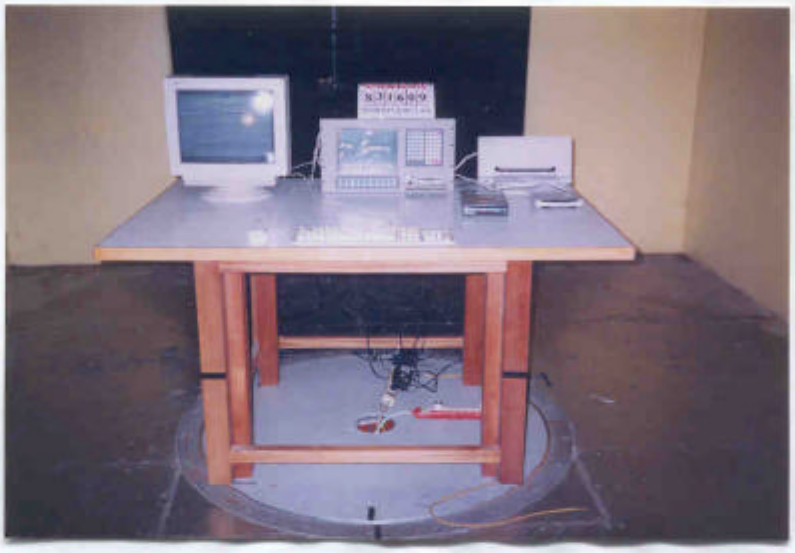
Antenna Height 1 Meter , Turntable Degree 110°

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Limits (uV/m)	Emission (dBuV/m)	Level (uV/m)	Margin (dB)
66.00	H	6.00	1.38	18.72	40.00	100	26.10	20.18	-13.90
272.00	H	12.59	2.73	16.44	47.00	224	31.76	38.73	-15.24
299.20	H	13.57	2.90	18.93	47.00	224	35.40	58.88	-11.60
33.23	V	16.34	1.03	15.76	40.00	100	33.13	45.34	-6.87
132.34	V	11.32	2.23	17.85	40.00	100	31.40	37.15	-8.60
182.66	V	9.01	2.04	18.46	40.00	100	29.51	29.89	-10.49

Test Engineer : Jack Day

6.5. PHOTOGRAPHS OF RADIATED EMISSION TEST CONFIGURATION

FRONT VIEW



REAR VIEW

7. PHOTOGRAPHS OF EUT APPEARANCE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8. 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

9. LIST OF MEASURING EQUIPMENT USED

INSTRUMENT	Manufacturer	Model No.	Serial No.	Characteristic	Calibration date	Remark
Receiver RF Section	HP	85462A	3325A00108	9 KHz - 6.5 GHz	Oct. 22, 1997	C
RF Section	HP	85460A	3308A00104	9 KHz - 6.5 GHz	Oct. 22, 1997	C
LISN	EMCO	3850/2	1035	50 ohm / 50 uH	Oct. 27, 1997	C
LISN	KYORITSU	KNW-407	8-693-10	50 ohm / 50 uH	Oct. 04, 1997	C
EMI Filter	CORCOM	MRI-2030	N/A	480 VAC / 30 A	N/A	C
EMI Filter	CORCOM	MRI-2030	N/A	480 VAC / 30 A	N/A	C
Half-wave dipole antenna	EMCO	3121C	9705-1285	28M-1GHZ	May. 19, 1997	R
Amplifier (Site 2)	HP	8447D	2944A07523	0.1 MHz -1.3 GHz	Nov. 20, 1997	R
Spectrum Analyzer (Site 2)	HP	8594	3051A00172	100Hz - 1.5GHz	Mar. 24, 1997	R
Bilog Antenna (Site 2)	EMCO	3142	9703-1152	30 MHz -2000 MHz	May. 20, 1997	R
Turn Table (site 2)	EMCO	2081-1.23	9703-1090	0 ~ 360 degree	N/A	R
Antenna Mast (site 2)	EMCO	2070-2	9703-2041	1 m- 4 m	N/A	R

※ The column of Remark indicates that the instruments used for conduction ("C") or radiation ("R") test.