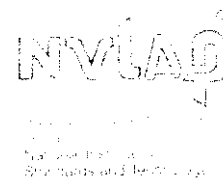


SPORTON INTERNATIONAL INC.



FCC TEST REPORT

FCC/MELLON

DEC 07 1998

REPORT NO. : F882606

FCC TEST REPORT

for

PART 15, SUBPART B CLASS B

Equipment : Cardbus 10/100M Ethernet PC Card

MODEL NO. : FE2000 rev.B1

F C C I D : MQ4FE2KB

Filing Type : Original Grant

APPLICANT : **ABOCOM SYSTEMS INC.**

12F-3, No. 333, SEC. 1, Guan-Fu Rd.,
Hsin-Chu, 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.

SPORTON International Inc.

TEL: 886-2-2696-2468

FAX: 886-2-2696-2255

F C C I D

ISSUED DATE

PAGE NUMBER

: MQ4FE2KB

: Sep. 10, 1998

: 1 OF22

EXHIBIT B

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CERTIFICATE OF COMPLIANCE

for

FCC PART 15, SUBPART B CLASS B

Equipment : Cardbus 10/100M Ethernet PC Card

MODEL NO. : FE2000 rev.B1

F C C I D : MQ4FE2KB

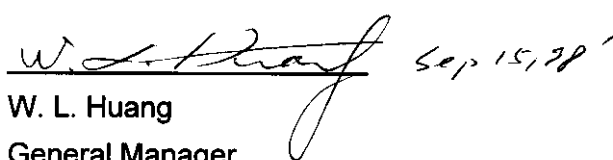
Filing Type : Original Grant

APPLICANT : **ABOCOM SYSTEMS INC.**

12F-3, No. 333, SEC. 1, Guan-Fu Rd.,
Hsin-Chu, Taiwan, R.O.C.

I HEREBY CERTIFY THAT :

The measurement shown in this report were made in accordance with the procedures given in **ANSI C63.4 -1992** and the energy emitted by this equipment was **passed** both radiated and conducted emissions CLASS B limits. Testing was carried out on FEB. 18, 1998 at **SPORTON International Inc.** in LIN KOU.


W. L. Huang
General Manager

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

ABOCOM SYSTEMS INC.
12F-3, No. 333, SEC. 1, Guan-Fu Rd.,
Hsin-Chu, Taiwan, R.O.C.

1.2. MANUFACTURER

Same as 1.1

1.3. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

EQUIPMENT : Cardbus 10/100M Ethernet PC Card

MODEL NO. : FE2000 rev.B1

FCC ID:MQ4FE2KB

TRADE NAME : ABOCOM

Twisted Pair DATA CABLE : Non-shielded

POWER CORD : N/A

1.4. FEATURE OF EQUIPMENT UNDER TEST

- 10Mbps ethernet: IEEE 802.3 standard 10BaseT baseband CSMA/CD local area network.
- 100Mbps ethernet: IEEE 802.3u standard 100Base-TX baseband CSMA/CD local area network.
- 20/200Mbps full duplex support
- Autonegotiation between all four operation modes.

2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

2.1. TEST MANNER

- a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The DELL keyboard, SONY monitor, HP printer and ACEEX modem, GENIUS mouse were connected to the IBM NOTEBOOK PC.
- c. The 10Mbps and 100Mbps were tested in order to find the maximum emission. Since the 100Mbps generates the worst case, the mode was used as the final data.
- d. Using the twisted Pair cable to connect the EUT and workstation which is installed with the other ethernet lan card.
- e. During testing, the notebook PC LCD and external CRT display at same time.
- f. Frequency range investigated: Conduction 450 KHz to 30 MHz, Radiation 30 MHz to 1000 MHz.

2.2. DESCRIPTION OF TEST SYSTEM

Support Device 1. --- NOTEBOOK PERSONAL COMPUTER (IBM)

FCC ID :N/A
Model No. :97-6492R
Serial No. :SP1045
Data Cable :Shielded, 360 degree via metal backshells
Power Cord :Non-shielded
Power Supply Type :Switching

Remark: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Device 2. --- MODEM (AECCX)

FCC ID :IFAXDM1414
Model No. :DM1414
Serial No. :SP0022
Data Cable :Shielded, 360 degree via metal backshells.
Power Supply Type :Linear

FCC TEST REPORT**REPORT NO. : F882606****Support Device 3. --- PRINTER (HP)**

FCC ID :DSI6XU2225
Model No. :2225C
Serial No. :SP0003
Data Cable :Shielded, 360 degree via metal backshells
Power Supply Type :Linear

Support Device 4. --- MONITOR (SONY)

FCC ID :AK8GDM17SE2T
Model No. :GDM-17SE2T
Serial No. :SP1040
Data Cable :Shielded
Power Supply Type :Switching
Power Cord :Non-shielded

Support Device 5. --- KEYBOARD (DELL)

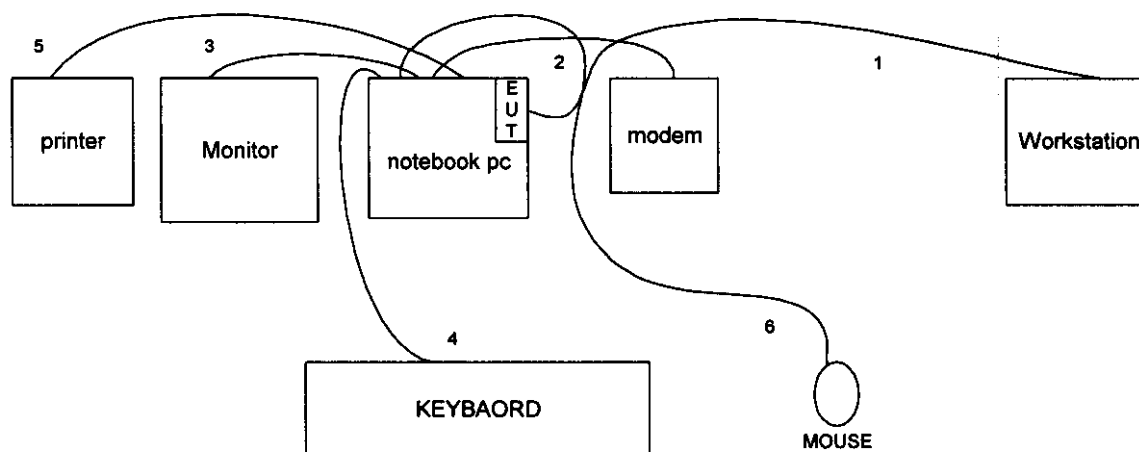
FCC ID :GYUM92SK
Model No. :AT101
Serial No. :SP1013
Data Cable :Shielded, 360 degree via metal backshells.

Support Device 6. --- ETHERNET LAN CARD (CIS)

FCC ID :L4OD300
Model No. :D300
Serial No. :SP1036
TP Data Cable :Non-shielded

Support Device 7. --- USB MOUSE (TREMONT)

FCC ID :JKGMUS2P01
Model No. :MUS2P
Serial No. :SP1030
Data Cable :Non-shielded

2.3. CONNECTION DIAGRAM OF TEST SYSTEM

1. The Twisted Pair cable is connected to the support device 6.
2. The I/O cable is connected to the support device 2.
3. The I/O cable is connected to the support device 4.
4. The I/O cable is connected to the support device 5.
5. The I/O cable is connected to the support device 3.
6. The I/O cable is connected to the support device 7.

Remark: The workstation PC, FCC ID:HCJVECTRAVE4.

3. TEST SOFTWARE

3.0 Using the following batch files to connect the EUT and workstation with Twisted Pair cable.

- a. For EUT: In DOS mode, running the "LSL.EXE"
 - b. For workstation: In DOS mode, running the batch file "LSL.EXE"
-
- a. Turn on the power of all equipment.
 - b. The EUT transmits the "H" character to the other EUT.
 - c. The monitor then displaying the "H" characters on the screen continuously and repeatedly.
 - d. The PC sends " H " messages to the printer, then the printer prints it on the paper.
 - e. The PC sends " H " messages to the modem.
 - f. The PC sends " H " messages to the internal Hard Disk, then 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. in an openarea test site.

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

ANSI C63.4-1992

4.3 .TEST IN COMPLIANCE WITH

FCC PART 15, SUBPART B CLASS B

4.4. FREQUENCY RANGE INVESTIGATED

a. Conduction : from 450 KHz to 30 MHz

b. Radiation : from 30 MHz to 1000 MHz

4.5. TEST DISTANCE

The test distance of radiated emission from antenna to EUT is 3M.

5. TEST OF CONDUCTED POWERLINE

Conducted Emissions were measured from 450 KHz to 30 MHz with a bandwidth of 9 KHz on the 115 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. 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 produced maximum conducted emissions.

5.1. MAJOR MEASURING INSTRUMENTS

- Test Receiver (HP 85462A)
 - Attenuation 0 dB
 - Start Frequency 0.45 MHz
 - Stop Frequency 30 MHz
 - Step MHz 0.007 MHz
 - IF Bandwidth 9 KHz

5.2. TEST PROCEDURES

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room and was kept at least 80 centimeters 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 FCC 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 450 KHz to 30 MHz was searched.
- h. Set the test-receiver system (HP 85462A) 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 on by one using the quasi-peak method and reported.

5.4. TEST RESULT OF AC POWERLINE CONDUCTED EMISSION

- Frequency Range of Test : from 0.45 MHz to 30 MHz
- Temperature : 25°C
- Relative Humidity : 47% RH
- All emissions not reported here are more than 10 dB below the prescribed limit.
- Test Date : Sep. 02, 1998

The Conducted Emission test was passed at minimum margin

Line 2.82 MHz / 44.00 dBuV.

Frequency (MHz)	Line / Neutral	Meter Reading		Limits		Margin (dB)
		(dBuV)	(uV)	(dBuV)	(uV)	
2.82	L	44.00	158.49	48.00	251.19	-4.00
11.85	L	43.10	142.89	48.00	251.19	-4.90
13.30	L	43.10	142.89	48.00	251.19	-4.90
12.24	L	42.20	128.82	48.00	251.19	-5.80
11.85	N	42.30	130.32	48.00	251.19	-5.70
13.50	N	42.30	130.32	48.00	251.19	-5.70

Test Engineer :

PETER WANG

Peter Wang

7. ANTENNA FACTOR AND CABLE LOSS

Frequency (Mhz)	Antenna Factor (dB)	Cable Loss (dB)
30	-2.20	0.80
35	-0.70	0.82
40	0.51	0.94
45	1.30	1.00
50	2.39	1.00
55	3.14	1.11
60	4.40	1.20
65	5.14	1.20
70	5.59	1.20
75	6.11	1.30
80	7.10	1.40
85	7.53	1.40
90	8.22	1.40
95	8.80	1.40
100	9.36	1.50
110	10.11	1.60
120	10.41	1.70
130	10.74	1.80
140	11.42	1.91
150	11.91	2.01
160	12.25	2.01
170	12.22	2.21
180	13.02	2.30
190	13.50	2.30
200	14.05	2.40
220	14.31	2.40
240	15.11	2.50
260	17.11	2.61
280	17.50	2.70
300	17.99	3.11
320	18.10	3.10
340	19.13	3.20
360	20.14	3.30
380	21.81	3.40
400	22.29	3.60
450	22.40	3.80
500	22.31	4.10
550	23.42	4.40
600	24.01	4.60
650	25.11	5.00
700	26.00	5.30
750	26.51	5.51
800	27.10	5.70
850	27.51	5.90
900	27.90	6.20
950	30.01	6.30
1000	29.00	6.40

※Remark: For frequency above 1000 MHz, we used low cable loss BNC cable to test.

8. LIST OF MEASURING INSTRUMENTS USED

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Receiver RF section (site 1)	HP	85462A	3325A00108	9 KHz - 6.5 GHz	Oct. 22, 1997	Conduction
RF Filter section (site 1)	HP	85460A	3308A00104	9 KHz - 6.5 GHz	Oct. 22, 1997	Conduction
LISN (EUT) (site 1)	EMCO	3850/2	1035	50 ohm / 50 uH	Oct. 27, 1997	Conduction
LISN (Support Unit) (site 1)	KYORITSU	KNW-407	8-693-10	50 ohm / 50 uH	Oct. 04, 1997	Conduction
EMI Filter (site 1)	CORCOM	MRI-2030	N/A	480 VAC / 30 A	N/A	Conduction
Amplifier (Site 1)	HP	87405A	3207A01437	10MHz ~3.0GHz	Jun. 26, 1998	Radiation
Spectrum Analyzer (site 1)	HP	8560E	3728A03185	30Hz ~ 2.9GHz	Sep. 24, 1997	Radiation
Receiver (Site 1)	R&S	ESCS30	70-213-4258	9KHz - 2.75GHz	Dec. 19, 1997	Radiation
Bilog Antenna (Site 1)	CHASE	CBL6112A	2442	30MHz -2GHz	Jun. 22, 1998	Radiation
Half-wave dipole antenna (site 1)	EMCO	3121C	9705-1285	28 M - 1GHz	May 19, 1998	Radiation
Turn Table (site 1)	EMCO	1060-1.211	9507-1805	0 ~ 360 degree	N/A	Radiation
Antenna Mast (site 1)	EMCO	1051-1.2	9502-1868	1 m - 4 m	N/A	Radiation

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

6. TEST OF RADIATED EMISSION

Radiated emissions from 30 MHz to 1000MHz were measured with a bandwidth of 120 KHz according to the methods defines in ANSI C63.4-1992. 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. MAJOR MEASURING INSTRUMENTS

- Amplifier (HP 87405A)
 - Attenuation 0 dB
 - RF Gain 25 dB
 - Signal Input 10 MHz to 3 GHz

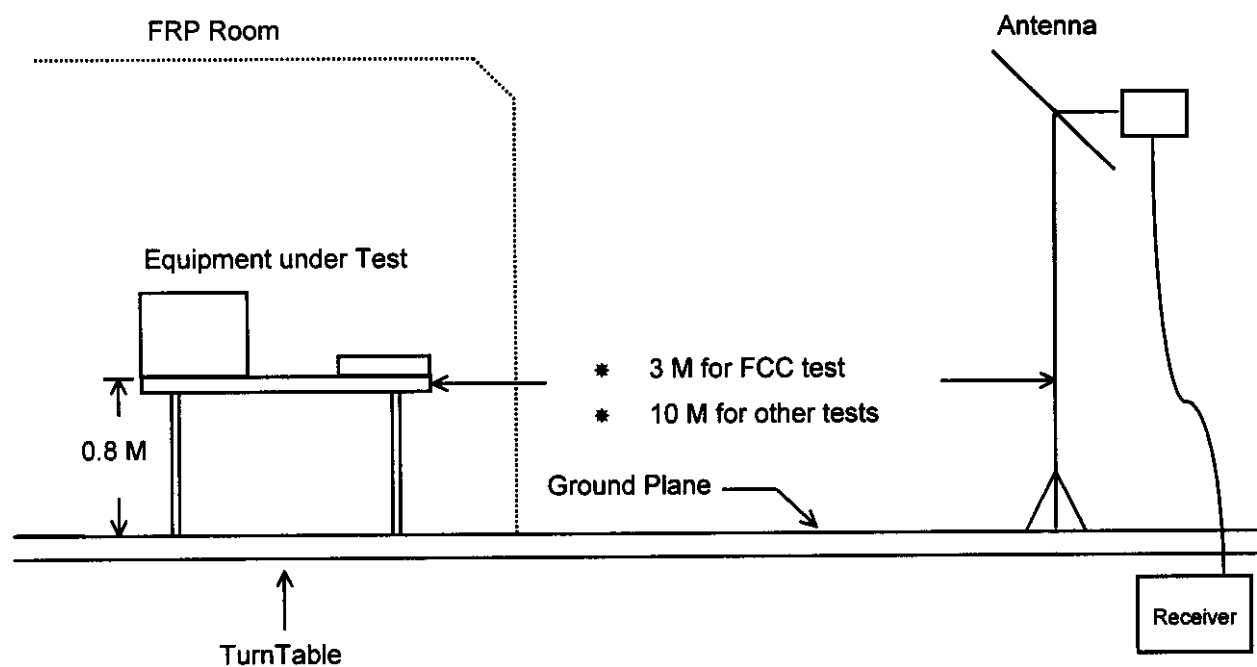
- Spectrum Analyzer (HP 8560E)
 - Attenuation 0 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1000 MHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 30 Hz to 2.9 GHz

- Test Receiver (R&S ESCS30)
 - Resolution Bandwidth 120 KHz
 - Frequency Band 30 MHz to 1 GHz
 - Quasi-Peak Detector ON for Quasi-Peak Mode
OFF for Peak Mode

6.2. TEST PROCEDURES

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 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 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 15.109
- Frequency Range of Test : from 30 MHz to 1000 MHz
- Test Distance : 3 M
- Temperature : 35°C
- Relative Humidity : 43 % RH
- Test Date : Aug. 26, 1998
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Sample Calculation at 50.18 MHz
Corrected Reading = 2.42+ 1.00+ 32.99= 36.41(dBuV/m)

The Radiated Emission test was passed at minimum margin

Vertical 50.18 MHz / 36.41 dBuV

Antenna Height 1.0 Meter , Turntable Degree 281 °.

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin
Polarity	Factor	Loss					
(MHz)	(dB)	(dB)	(dBuV)	(dBuV)	(uV)	(dBuV)	(uV) (dB)
50.18	V	2.42	1.00	32.99	40.00	100	36.41 66.15 -3.59
96.00	V	8.91	1.42	24.60	43.50	150	34.93 55.78 -8.57
150.04	V	11.91	2.01	22.83	43.50	150	36.75 68.79 -6.75
174.84	V	12.61	2.25	20.36	43.50	150	35.22 57.68 -8.28
50.18	H	2.42	1.00	32.66	40.00	100	36.08 63.68 -3.92
75.49	H	6.21	1.31	28.43	40.00	100	35.95 62.73 -4.05

Test Engineer :

TERRY CHANG

Terry Chang