



Test Report

For

Applicant : AboCom Systems, **Inc.**
Equipment Type : CardBus 10/100M Ethernet
PC Card
Model : FE2500MX, TE100-PCBUSR
FCC ID : MQ4C2K5MX

Report No. : 004H045FI



Test Report Certification

QuieTek Corporation

No.75-1, Wang-Yeh Valley, Yung-Hsing, Chiung-Lin,

Hsin-Chu County, Taiwan, R.O.C.

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Accredited by NIST(NVLAP), VCCI, BSMI, DNV, TUV

Applicant : AboCom Systems, Inc.

Address : 1F, No. 21, R&D Rd. II, Science-Based Industrial Park, Hsin Chu, Taiwan, R.O.C.

Equipment Type : CardBus 10/100M Ethernet PC Card

Model : FE2500MX, TE100-PCBUSR

Measurement Standard : CISPR 22/1994

Measurement Procedure : ANSI C63.4 /1992

FCC ID : MQ4C2K5MX

Operation Voltage : DC 3.3V

Classification : Class B

Test Result : Complied

Test Date : APR. 22, 2000

Report No. : 004H045FI



The Test Results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented by: Kim Hung

Test Engineer: Jack Wu

Approved: Gene Chang



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1. General Information

1.1 EUT Description

Applicant : AboCom Systems, [Inc.](#)

Address : 1F, No. 21, R&D Rd. II, Science-Based Industrial Park, Hsin Chu, Taiwan, R.O.C.

Equipment Type : CardBus 10/100M Ethernet PC Card

Model : FE2500MX, TE100-PCBUSR

FCC ID : MQ4C2K5MX

Data Cable(MAU) : **Non-shielded, 0.2m**

Remark:

1. The EUT is a CardBus 10/100M Ethernet PC Card. The EUT for each model is identical. The difference of model name are two different company shown as below:
 - 1) FE2500MX for AboCom
 - 2) TE100-PCBUSR for OEM Company
2. QuieTek had verified both construction and function in typical operation, then shown in this test report.



1.2 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

1.2.1 Notebook

Model Number : Think Pad 570
Manufacturer : IBM
Serial Number : 27L8835
FCC ID : DoC

CardBus 10/100M Ethernet PC Card (EUT)

Model Number : FE2500MX, TE100-PCBUSR
Serial Number : N/A
FCC ID : MQ4C2K5MX
Manufacturer : AboCom
Data Cable(MAU) : Non-shielded, 0.2m
Power Adapter : IBM, 02K6543
Cable In : Non-shielded, 1.5m
Cable Output : Non-shielded, 1.8m

1.2.2 Monitor

Model Number : CM752ET-311
Serial Number : T8D003312
FCC ID : DoC
Manufacturer : HITACHI
Data Cable : Shielded, 1.6m
Power Cord : Shielded, 1.8m

1.2.3 Modem

Model Number : 1414
Serial Number : 980033039
FCC ID : IFAXDM1414
Manufacturer : ACEEX
Data Cable : Shielded, 1.5m
Power Adapter : ACCEX, SCP41-91000A
Cable Output : Shielded, 1.5m



1.2.4	Printer	
	Model Number	: C2642A
	Serial Number	: MY75J1D1D2
	FCC ID	: B94C2642X
	Manufacturer	: HP
	Data Cable	: Shielded, 1.2m
	Power Adapter	: NMB, C2175A
		Cable for AC IN: Non-shielded, 0.7m
		Cable for AC Out: Non-shielded, 1.5m
1.2.5	Mouse	
	Model Number	: M-S34
	Serial Number	: LZB75078465
	FCC ID	: DZL211029
	Manufacturer	: HP
	Data Cable	: Shielded, 1.8m
1.2.6	Microphone	
	Model Number	: CD-8000
	Serial Number	: N/A
	FCC ID	: DoC
	Manufacturer	: AIWA
	Data Cable	: Non-shielded, 1m
1.2.7	Earphone	
	Model Number	: PH136
	Serial Number	: N/A
	Manufacturer	: BSD
	Data Cable	: Shielded, 1.2m
1.2.8	Video Camera	
	Model Number	: Wcam 3X
	Serial Number	: N/A
	FCC ID	: DoC
	Manufacturer	: Mustek
	Data Cable (USB)	: Shielded, 1.5m

1.2.9 Speaker

Model Number : J-009
Serial Number : 97-C-019799-T
FCC ID : DoC
Manufacturer : JS
Data Cable : Shielded, 1.2m

Team 1

1.2.10 Host Personal Computer

Model Number : P2L97
Serial Number : 92M1Y00768
FCC ID : DoC
Manufacturer : ASUS

LAN Card

Model Number : DFE-500TX
Serial Number : 0080C8 958320
FCC ID : KA2APC500X3
Manufacturer : D-LINK
Power Cord : Non-shielded, 1.8m

1.2.11 Monitor

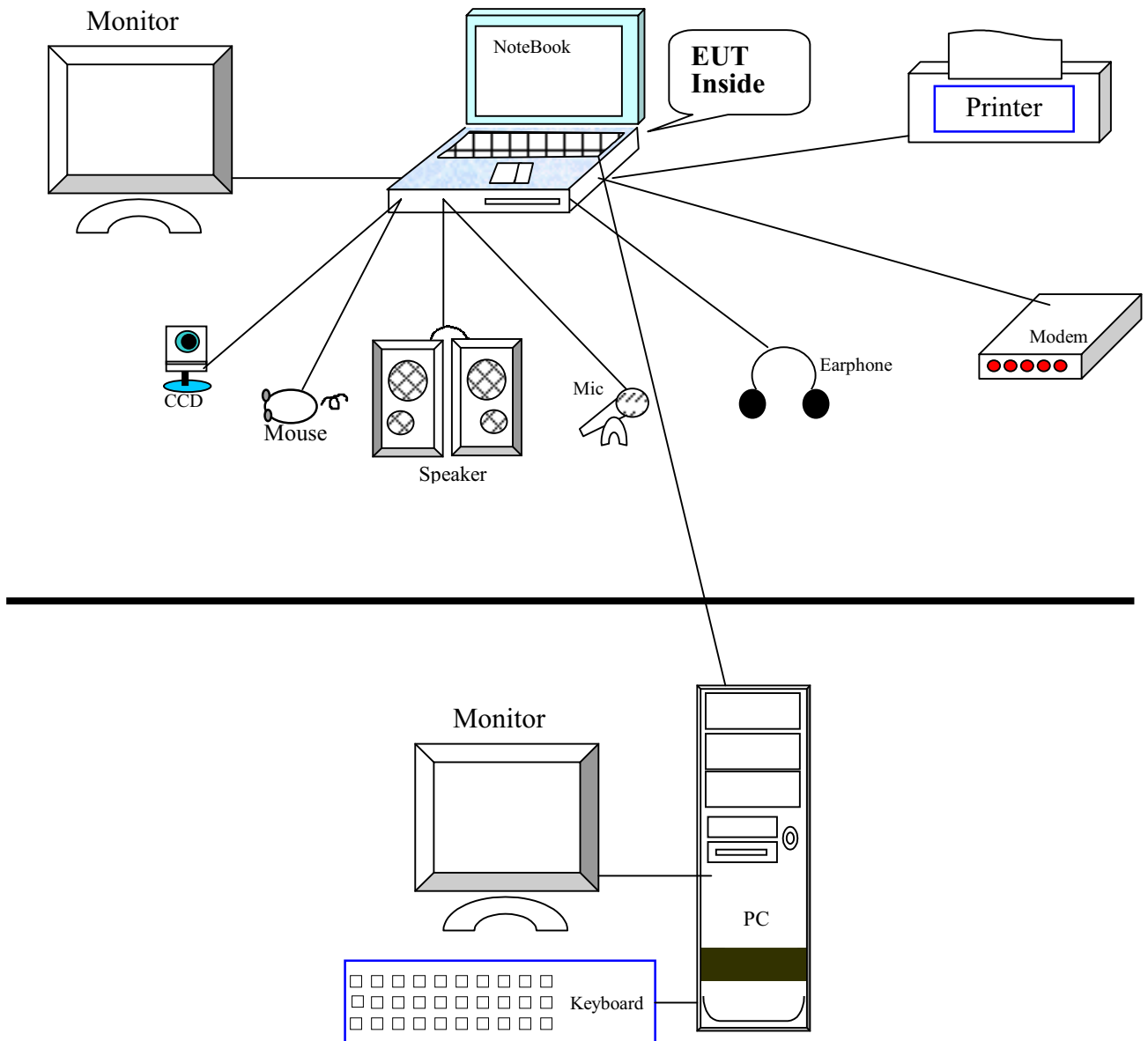
Model Number : CM752ET-311
Serial Number : T8E004443
FCC ID : DoC
Manufacturer : HITACHI
Data Cable : Shielded, 1.5m
Power Cord : Shielded, 1.8m

1.2.12 Keyboard

Model Number : 6311-TW4C
Serial Number : 916590704C91F24436
FCC ID : DoC
Manufacturer : ACER
Data Cable : Shielded, 1.8m



1.3 EUT Configuration



1.4 EUT Exercise Software

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

- 1.4.1 Setup the EUT and simulators as shown on 1.3.
- 1.4.2 Turn on the power of all equipment.
- 1.4.3 Personal Computer reads data from disk.
- 1.4.4 Data will be transmitted between Notebook and partner PC through EUT.
- 1.4.5 The transmission status will be shown on the monitor.
- 1.4.6 Repeat the above procedure 1.4.4 to 1.4.5

1.5 Test performed

Conducted emissions were investigated over the frequency range from **0.15MHz to 30MHz** using a receiver bandwidth of 9kHz.

Radiated emissions were investigated over the frequency range from **30MHz to 1000MHz** using a receiver bandwidth of 120kHz. Radiated testing was performed at an antenna to EUT distance of **10 meters**.



1.6 Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: November 3, 1998 File on

Federal Communications Commission

FCC Engineering Laboratory

7435 Oakland Mills Road

Columbia, MD 21046

Reference 31040/SIT1300F2



September 30, 1998 Accreditation on NVLAP

NVLAP Lab Code: 200347-0

February 23, 1999 Accreditation on DNV

Statement No. : 413-99-LAB11



December 8, 1998 Registration on VCCI

Registration No. for No.2 Shielded Room C-858

Registration No. for No.1 Open Area Test Site R-823

Registration No. for No.2 Open Area Test Site R-835



January 04, 1999 Accreditation on TÜV Rheinland

Certificate No.: I9865712-9901



Name of firm : QuieTek Corporation

Site location : No.75-1, Wang-Yeh Valley, Yung-Hsing Tsuen,
Chiung-Lin, Hsin-Chu County, Taiwan, R.O.C.



2. Conducted Emission

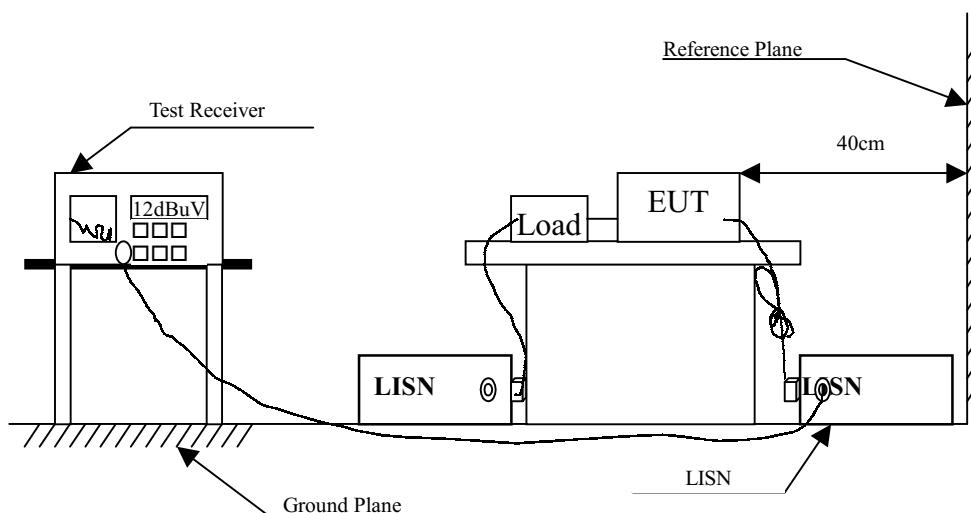
2.1 Test Equipment List

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal..	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 1999	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 1999	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 1999	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	N/A	
5	N0.2 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.2 Test Setup



2.3 Limits

CISPR 22 Limits (dBuV)					FCC Part 15 Subpart B (dBuV)				
Frequency MHz	Class A		Class B		Frequency MHz	Class A		Class B	
	QP	AV	QP	AV		uV	dBuV	uV	dBuV
0.15 - 0.50	79	66	66-56	56-46	0.45-1.705	1000	60.0	250	48.0
0.50-5.0	73	60	56	46	1.705-30	3000	69.5	250	48.0
5.0 - 30	73	60	60	50					

Remarks : In the above table, the tighter limit applies at the band edges.

2.4 Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 /1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

2.5 Test Results

The conducted emission from the EUT is measured and shown in Attachment 1 of test report. The acceptance criterion was met and the EUT passed the test.



3. Radiated Emission

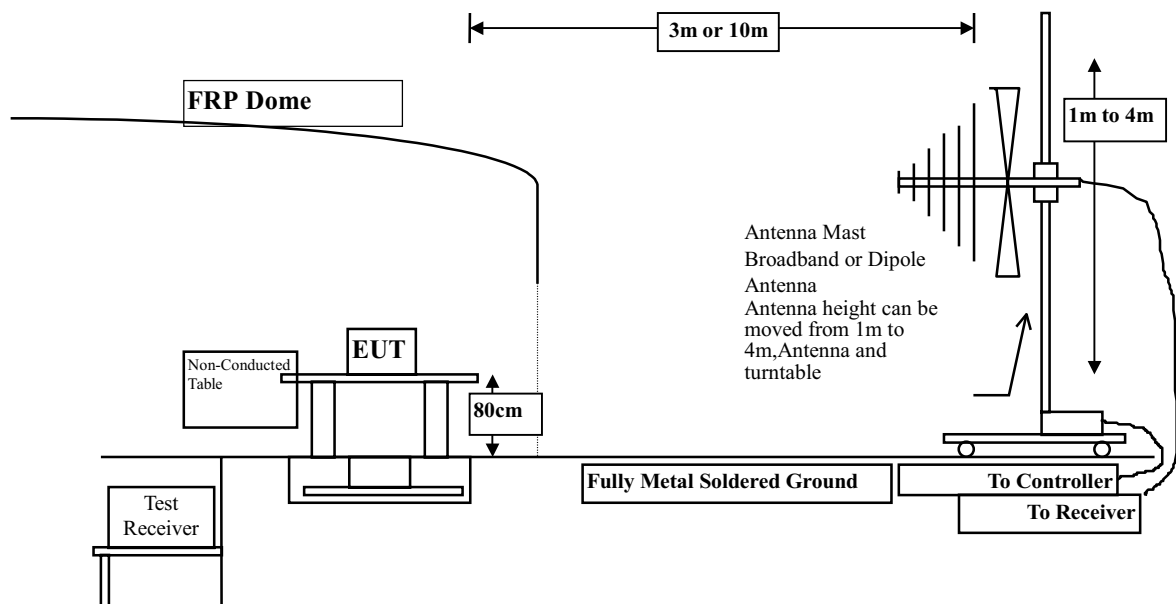
3.1 Test Equipment

The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 1999
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 1999
		Pre-Amplifier	HP	8447D/3307A01812	May, 1999
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 1999
	X	Horn Antenna	EM	EM6917 / 103325	May, 1999
Site # 2	X	Test Receiver	R & S	ESCS 30 / 825442/17	May, 1999
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 1999
		Pre-Amplifier	HP	8447D/3307A01814	May, 1999
	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 1999
	X	Horn Antenna	EM	EM6917 / 103325	May, 1999

- Note:
1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.

3.2 Test Setup



3.3 Limits

CISPR 22 Limits (dBuV)					FCC Part 15 Subpart B (dBuV)				
Frequency	Class A		Class B		Frequency	Class A		Class B	
MHz	Distance (m)	dBuV/m	Distance (m)	dBuV/m		uV/m	dBuV/m	uV/m	dBuV/m
30 – 230	10	40	10	30	30 – 88	90	39	100	40.0
230 – 1000	10	47	10	37	88 – 216	150	43.5	150	43.5
					216 – 960	210	46.5	200	46.0
					960 - 2000	300	49.5	500	54.0

Remark: 1. The tighter limit shall apply at the edge between two frequency bands.

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. RF Line Voltage (dBuV/m) = $20 \log$ RF Line Voltage (uV/m)

3.4 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 10 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4 /1992 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30) is 120 kHz.

3.5 Test Results

The radiated emission from the EUT is measured and shown in attachment 1 of test report. The acceptance criterion was met and the EUT passed the test.

4. EMI Reduction Method During Compliance Testing

No modification was made during testing.



5. Attachment

Attachment 1: Summary of Test Results	Number of Pages: 9
Attachment 2: EUT Test Photographs	Number of Pages: 4
Attachment 3: EUT Detailed Photographs	Number of Pages: 4



Attachment 1 : Summary of Test Results

The test results in the emission were performed according to the requirements of measurement standard and process. QuieTek Corporation is assumed full responsibility for the accuracy and completeness of these measurements. The test data of the emission and immunity are listed as the attached data.

All the tests were performed out with the EUT ([CardBus 10/100M Ethernet PC Card](#)) in normal operation, which were defined as:

[Mode 1: 10Mbps](#)

[Mode 2: 100Mbps](#)

The EUT passed all the tests.

The uncertainty is calculated in accordance with NAMAS NIS 81, The total uncertainty for this test is as follows:

➤ **Emission Test**

- Uncertainty in the Conducted Emission Test: $< \pm 2.0 \text{ dB}$
- Uncertainty in the field strength measured: $< \pm 4.0 \text{ dB}$



CONDUCTED EMISSION DATA

Date of Test : Apr. 22, 2000 EUT : FE2500MX
 Test Mode : Mode 1 Detect Mode : Quasi-Peak & Average

Frequency	Cable	LISN	Reading Level	Measurement Level	Limits
	Loss	Factor	Line1	Line1	
MHz	dB	dB	dBuV	dBuV	dBuV
*0.201	0.02	0.10	44.55	44.67	63.58
0.267	0.03	0.10	35.73	35.86	61.20
0.397	0.05	0.10	32.49	32.64	57.91
0.660	0.08	0.10	25.22	25.40	56.00
0.860	0.09	0.10	26.32	26.51	56.00
4.439	0.19	0.16	34.32	34.68	56.00

Average:

0.200	0.02	0.10	35.20	35.32	53.61
0.267	0.03	0.10	29.70	29.83	51.21
0.397	0.05	0.10	28.30	28.45	47.92
0.659	0.08	0.10	24.30	24.48	46.00
0.859	0.09	0.10	24.50	24.69	46.00
4.430	0.19	0.16	25.50	25.86	46.00

Remarks :

1. “ * ” means that this data is the worst emission level.



CONDUCTED EMISSION DATA

Date of Test : Apr. 22, 2000 EUT : CardBus 10/100M Ethernet PC Card

Test Mode : Mode 1 Detect Mode : Quasi-Peak & Average

Frequency	Cable	LISN	Reading Level	Measurement Level	Limits
MHz	Loss	Factor	Line2	Line2	
	dB	dB	dBuV	dBuV	dBuV
*0.201	0.02	0.10	45.87	45.99	63.58
0.263	0.03	0.10	39.31	39.44	61.33
0.398	0.05	0.10	33.64	33.79	57.89
0.663	0.08	0.10	23.72	23.90	56.00
4.310	0.19	0.16	34.30	34.65	56.00
16.169	0.33	0.37	29.77	30.47	60.00

Average:

0.200	0.02	0.10	34.90	35.02	53.61
0.263	0.03	0.10	31.20	31.33	51.34
0.398	0.05	0.10	27.00	27.15	47.90
0.663	0.08	0.10	19.60	19.78	46.00
4.310	0.19	0.16	21.70	22.05	46.00
16.160	0.33	0.37	25.60	26.30	50.00

Remarks :

1. “ * ” means that this data is the worst emission level.



CONDUCTED EMISSION DATA

Date of Test : Apr. 22, 2000 EUT : M-BE58
 Test Mode : Mode 2 Detect Mode : Quasi-Peak & Average

Frequency	Cable	LISN	Reading Level	Measurement Level	Limits
	Loss	Factor	Line1	Line1	
MHz	dB	dB	dBuV	dBuV	dBuV
*0.201	0.02	0.10	45.91	46.03	63.58
0.263	0.03	0.10	39.17	39.30	61.33
0.396	0.05	0.10	33.45	33.60	57.93
0.662	0.08	0.10	23.37	23.55	56.00
4.177	0.19	0.16	31.73	32.08	56.00
15.712	0.33	0.36	29.68	30.37	60.00

Average:

0.200	0.02	0.10	34.80	34.92	53.61
0.263	0.03	0.10	31.00	31.13	51.34
0.396	0.05	0.10	28.20	28.35	47.94
0.661	0.08	0.10	19.30	19.48	46.00
4.177	0.19	0.16	25.30	25.65	46.00
15.700	0.33	0.36	23.10	23.79	50.00

Remarks :

1. “ * ” means that this data is the worst emission level.



CONDUCTED EMISSION DATA

Date of Test : Apr. 22, 2000 EUT : CardBus 10/100M Ethernet PC Card

Test Mode : Mode 2 Detect Mode : Quasi-Peak & Average

Frequency	Cable	LISN	Reading Level	Measurement Level	Limits
MHz	Loss	Factor	Line2	Line2	
	dB	dB	dBuV	dBuV	dBuV
*0.201	0.02	0.10	45.77	45.89	63.58
0.266	0.03	0.10	39.73	39.86	61.25
0.398	0.05	0.10	34.06	34.21	57.89
0.596	0.07	0.10	24.47	24.64	56.00
3.908	0.18	0.16	31.74	32.08	56.00
16.302	0.33	0.38	29.90	30.61	60.00

Average:

0.200	0.02	0.10	34.70	34.82	53.61
0.265	0.03	0.10	30.90	31.03	51.27
0.398	0.05	0.10	28.10	28.25	47.90
0.595	0.07	0.10	20.40	20.57	46.00
3.900	0.18	0.16	24.60	24.94	46.00
16.300	0.33	0.38	25.60	26.31	50.00

Remarks :

1. “ * ” means that this data is the worst emission level.



RADIATED EMISSION DATA

Date of Test : **Apr. 22, 2000** EUT : **CardBus 10/100M Ethernet PC Card**

Test Mode : **Mode 1** Test Site : **No.2 Open Test Site**

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit	Ant	Turn
MHz	Loss	Factor		Level	Horizontal			cm	deg
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m		
50.000	1.35	7.93	0.00	1.33	10.61	19.39	30.00	395	58
125.000	2.07	11.84	0.00	2.95	16.86	13.14	30.00	395	174
150.000	2.31	10.72	0.00	2.82	15.85	14.15	30.00	395	51
*200.000	2.78	9.30	0.00	6.04	18.12	11.88	30.00	395	106
250.000	3.27	12.61	0.00	0.03	15.91	21.09	37.00	395	92
400.098	4.28	15.85	0.00	-0.32	19.81	17.19	37.00	300	80

Remarks:

- 1.All Readings below 1GHz are Quasi-Peak, above are average value.
- 2.“ * ”, means this data is the worst emission level.
- 3.Emission Level = Reading Level + Antenna Factor + Cable loss



RADIATED EMISSION DATA

Date of Test : Apr. 22, 2000 EUT : CardBus 10/100M Ethernet PC Card

Test Mode : Mode 1 Test Site : No.2 Open Test Site

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit	Ant	Turn
	Loss	Factor		Level	Vertical				
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	cm	deg
50.000	1.35	7.39	0.00	16.17	24.91	5.09	30.00	99	9
*75.000	1.58	6.83	0.00	17.85	26.26	3.74	30.00	99	69
125.000	2.07	11.49	0.00	5.76	19.32	10.68	30.00	99	187
150.000	2.31	10.43	0.00	8.46	21.20	8.80	30.00	99	187
200.000	2.78	9.07	0.00	8.94	20.80	9.20	30.00	99	13
400.000	4.28	16.05	0.00	-1.18	19.15	17.85	37.00	99	160

Remarks:

- 1.All Readings below 1GHz are Quasi-Peak, above are average value.
- 2.“ * ”, means this data is the worst emission level.
- 3.Emission Level = Reading Level + Antenna Factor + Cable loss.



RADIATED EMISSION DATA

Date of Test : Apr. 22, 2000 EUT : CardBus 10/100M Ethernet PC Card

Test Mode : Mode 2 Test Site : No.2 Open Test Site

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit	Ant	Turn
	Loss	Factor		Level	Horizontal				
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	cm	deg
50.000	1.35	7.93	0.00	9.45	18.73	11.27	30.00	395	177
*125.000	2.07	11.84	0.00	5.88	19.79	10.21	30.00	395	11
150.000	2.31	10.72	0.00	-1.44	11.59	18.41	30.00	395	99
175.000	2.55	9.76	0.00	-1.70	10.61	19.39	30.00	395	99
200.000	2.78	9.30	0.00	5.96	18.04	11.96	30.00	395	99
275.000	3.51	12.91	0.00	-1.23	15.20	21.80	37.00	395	14
425.672	4.40	16.45	0.00	2.96	23.82	13.18	37.00	300	184

Remarks:

- 1.All Readings below 1GHz are Quasi-Peak, above are average value.
- 2.“ * ”, means this data is the worst emission level.
- 3.Emission Level = Reading Level + Antenna Factor + Cable loss

RADIATED EMISSION DATA

Date of Test : Apr. 22, 2000 EUT : CardBus 10/100M Ethernet PC Card

Test Mode : Mode 2 Test Site : No.2 Open Test Site

Freq.	Cable	Probe	PreAMP	Reading	Measurement	Margin	Limit	Ant	Turn
MHz	Loss	Factor		Level	Vertical			cm	deg
	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m		
50.000	1.35	7.39	0.00	11.04	19.78	10.22	30.00	100	51
*75.000	1.58	6.83	0.00	18.49	26.90	3.10	30.00	100	112
125.000	2.07	11.49	0.00	4.29	17.85	12.15	30.00	100	78
150.000	2.31	10.43	0.00	8.74	21.48	8.52	30.00	100	203
200.000	2.78	9.07	0.00	4.29	16.15	13.85	30.00	100	114
525.000	4.92	17.29	0.00	0.21	22.43	14.57	37.00	100	78

Remarks:

- 1.All Readings below 1GHz are Quasi-Peak, above are average value.
- 2.“ * ”, means this data is the worst emission level.
- 3.Emission Level = Reading Level + Antenna Factor + Cable loss.

