



# Test Report

For

**Applicant** : AboCom Systems, Inc.  
**Equipment Type** : HomeLink Phoneline 10M  
Network CardBus PC Card  
**Model** : HC2000MX  
**FCC ID** : MQ4HC2KMXA

**Report No. :** 011H023FI



## Test Report Certification

### Quietek Corporation

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

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

Tel : 886-3-592-8858, Fax: 886-3-592-8859

E-Mail : quietek@ms24.hinet.net

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

Applicant : AboCom Systems, Inc.  
Address : 1F, No.21, R&D Road II, Science-Based Industrial Park,  
Hsin-Chu , Taiwan, R.O.C.  
Equipment Type : HomeLink Phoneline 10M Network CardBus PC Card  
Model : HC2000MX  
FCC ID. : MQ4HC2KMXA  
Measurement Standard : CISPR 22/1985  
Measurement Procedure : ANSI C63.4 /1992  
Operation Voltage : DC 5V  
Classification : Class B  
Test Result : Complied  
Test Date : Jan.15, 2001  
Report No. : 011H023FI



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: Lisa Chen

Test Engineer: Calien Kang

Approved: Kevin Wang

Handwritten signature of Lisa Chen.

Handwritten signature of Calien Kang.

Handwritten signature of Kevin Wang.



# TABLE OF CONTENTS

Description	Page
<b>1. GENERAL INFORMATION .....</b>	<b>4</b>
1.1 EUT Description.....	4
1.2 Tested System Details .....	5
1.3 EUT Configuration.....	9
1.4 EUT Exercise Software .....	5
1.5 Test performed .....	10
1.6 Test Facility .....	11
<b>2. CONDUCTED EMISSION .....</b>	<b>12</b>
2.1 Test Equipment List.....	12
2.2 Test Setup.....	12
2.3 Limits.....	12
2.4 Test Procedure.....	13
2.5 Test Results.....	13
<b>3. RADIATED EMISSION.....</b>	<b>14</b>
3.1 Test Equipment .....	14
3.2 Test Setup.....	14
3.3 Limits.....	15
3.4 Test Procedure.....	15
3.5 Test Results.....	15
<b>4. EMI REDUCTION METHOD DURING COMPLIANCE TESTING.....</b>	<b>16</b>
<b>5. ATTACHMENT.....</b>	<b>17</b>
ATTACHMENT 1: SUMMARY OF TEST RESULTS	
ATTACHMENT 2: EUT TEST PHOTOGRAPHS	
ATTACHMENT 3: EUT DETAILED PHOTOGRAPHS	



# 1. General Information

## 1.1 EUT Description

Applicant : AboCom Systems, Inc.

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

Equipment Type : HomeLink Phonenumber 10M Network CardBus PC Card

Model : HC2000MX

FCC ID : MQ4HC2KMXA

Operation Voltage : DC 5V

Telephone Line : Non-shielded, 0.9m×1

Remark :

- 1.The EUT is a HomeLink Phonenumber 10M Network CardBus PC Card.with  
10/100Mbps transmission speed
- 2.QuieTek had verified the 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  
Power Adapter : IBM, 02K6543  
Cable In : Non-shielded, 1.5m  
Cable Output : Non-shielded, 1.8m

### 1.2.2 HomeLink Phonenumber 10M Network CardBus PC Card(EUT)

Model Number : HC2000MX  
Serial Number : N/A  
FCC ID : MQ4HC2KMXA  
Manufacturer : AboCom Systems, Inc.

### 1.2.3 Monitor

Model Number : CM752ET-311  
Serial Number : T8E004439  
FCC ID : DoC  
Manufacturer : HITACHI  
Data Cable : Shielded, 1.5m  
Power Cord : Shielded, 1.7m

### 1.2.4 Modem

Model Number : 1414  
Serial Number : 980033034  
FCC ID : IFAXDM1414  
Manufacturer : ACEEX  
Data Cable : Shielded, 1.5m  
Power Adapter : ACCEX, SCP41-91000A  
Cable Output : Shielded, 1.5m

### 1.2.5 Printer

Model Number : C2642A  
Serial Number : MY75L1D2XN  
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



- 1.2.6 Mouse**  
 Model Number : M-S34  
 Serial Number : LZA82760570  
 FCC ID : DZL211029  
 Manufacturer : Logitech  
 Data Cable : Shielded, 1.8m
- 1.2.7 USB Mouse**  
 Model Number : M-UE55  
 Serial Number : LTC93813283  
 FCC ID : DoC  
 Manufacturer : Logitech  
 Data Cable : Shielded, 1.8m
- 1.2.8 Microphone**  
 Model Number : CD-8000  
 Serial Number : N/A  
 FCC ID : DoC  
 Manufacturer : AIWA  
 Data Cable : Non-shielded, 1m
- 1.2.9 Earphone**  
 Model Number : PH136  
 Serial Number : N/A  
 Manufacturer : BSD  
 Data Cable : Shielded, 1.2m
- 1.2.10 Joystick**  
 Model Number : 8663136-0000  
 Serial Number : AE83700069  
 FCC ID : DZLBATMAN  
 Manufacturer : Logitech  
 Data Cable : Shielded, 2.0m
- 1.2.11 USB Video Camera**  
 Model Number : Wcam 3X  
 Serial Number : N/A  
 FCC ID : DoC  
 Manufacturer : Mustek  
 Data Cable (USB) : Shielded, 1.5m
- 1.2.12 Speaker**  
 Model Number : J-008  
 Serial Number : 99-D-235399-C  
 FCC ID : DoC  
 Manufacturer : JS  
 Data Cable : Non-shielded, 1.2m



**1.2.13 Walkman**  
Model Number : TB-1027  
Serial Number : TBS720101  
FCC ID : DoC  
Manufacturer : TOBISHI  
Data Cable : Non-shielded, 1.8m

**1.2.14 Telephone(1)**  
Model Number : KT-916  
Manufacturer : Kingtel  
Serial Number : 435829

**1.2.15 Telephone(2)**  
Model Number : VB 9411TEX  
Manufacturer : Matsushita  
Serial Number : A8CPBT77175

**1.2.16 Telephone : Non-shielded, 1.0m×1**



## Partner PC System

### 1.2.17 Host Personal Computer

Model Number : P2L97  
Serial Number : 92M4Y03978  
FCC ID : DoC  
Manufacturer : ASUS  
Power Cord : Non-shielded, 1.8m

### 1.2.18 USB 10M Heme PNA Adapter

Model Number : UHL 2000  
Serial Number : N/A  
FCC ID : DoC  
Manufacturer : AboCom  
USB Cable : Non-shielded, 1.0m

### 1.2.19 Monitor

Model Number : CM752ET-311  
Serial Number : T8F006364  
FCC ID : DoC  
Manufacturer : HITACHI  
Data Cable : Shielded, 1.5m  
Power Cord : Shielded, 1.8m

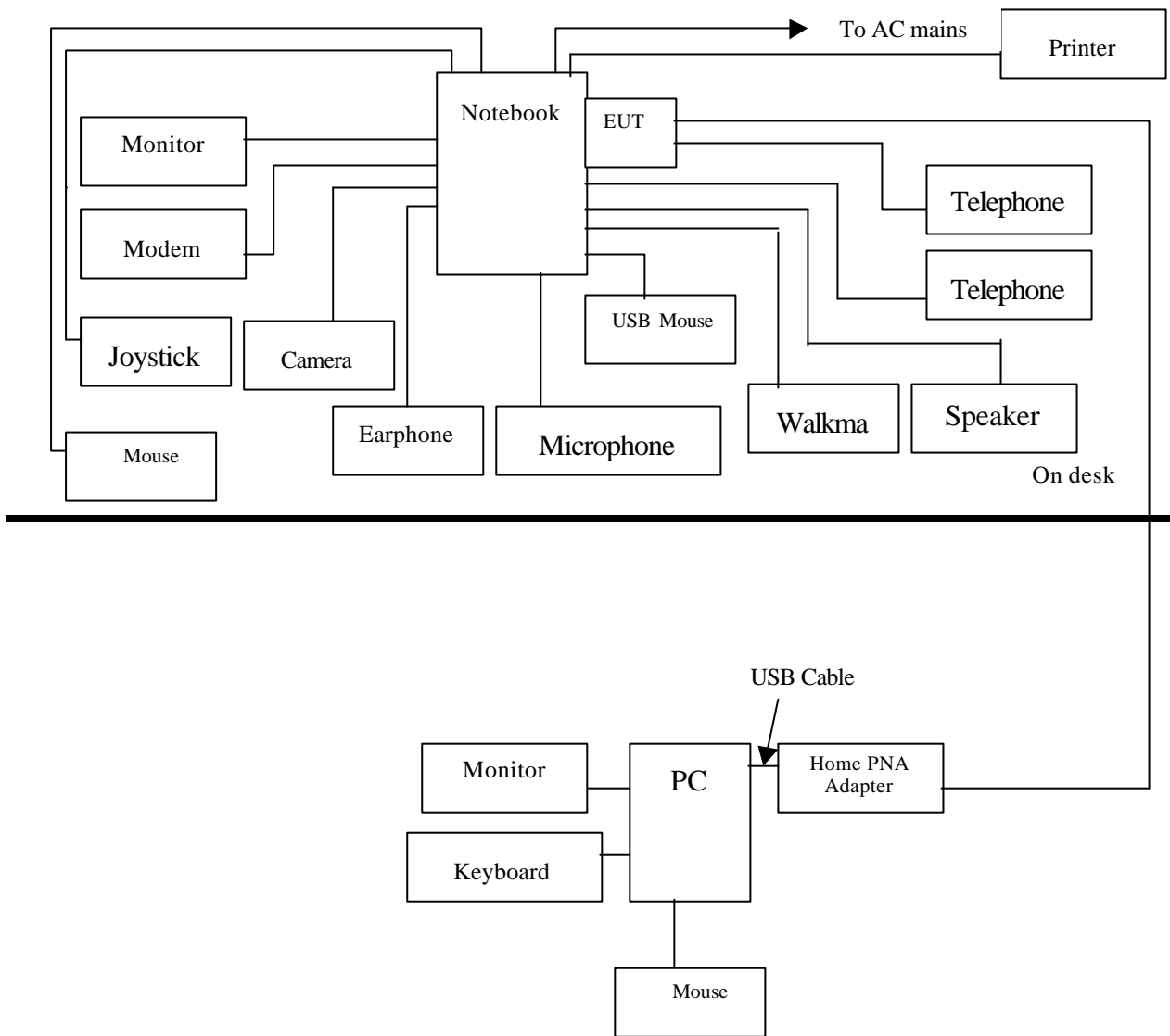
### 1.2.20 Mouse

Model Number : M-S34  
Serial Number : LZA71178588  
FCC ID : DZL211029  
Manufacturer : HP  
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 Boot the PC from Hard Disk .
- 1.4.4 Data will communicate between notebook personal computer and partner personal computer(1) through Cardbus Fast Ethernet PC card (EUT) that is within Notebook PC.
- 1.4.5 The notebook personal computer's and partner computer's monitor will show the transmitting and receiving characteristics when the communication is success.
- 1.4.6 Printer and modem will keep at standby mode during Scanner operation.
- 1.4.7 Repeat the above procedure 1.4.4 to 1.4.7

## 1.5 Test performed

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

Radiated emissions were invested 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

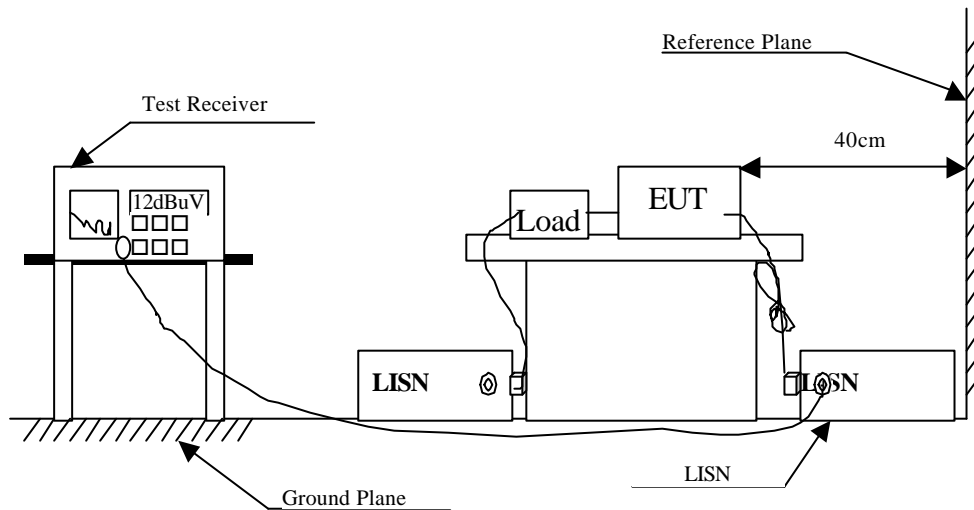
### 2.1 Test Equipment List

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, 2000	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2000	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2000	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

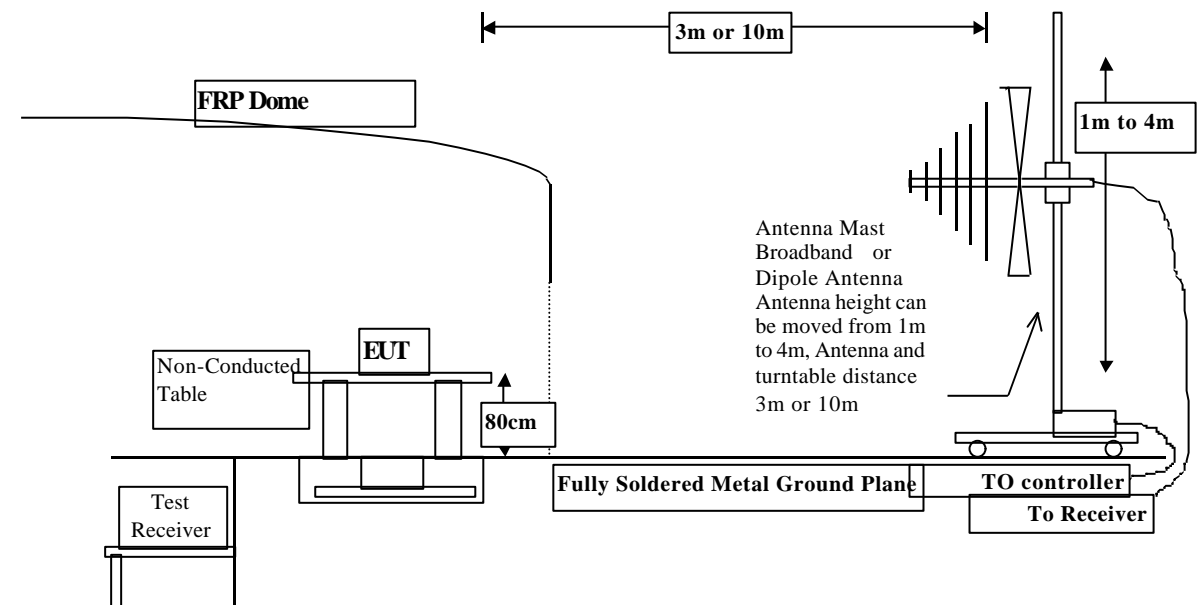
#### 3.1 Test Equipment

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, 2000
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2000
		Pre-Amplifier	HP	8447D/3307A01812	May, 2000
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2000
	X	Horn Antenna	EM	EM6917 / 103325	May, 2000
Site # 2	X	Test Receiver	R & S	ESCS 30 / 825442/17	May, 2000
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2000
		Pre-Amplifier	HP	8447D/3307A01814	May, 2000
	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2000
	X	Horn Antenna	EM	EM6917 / 103325	May, 2000

- 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					FCC Part 15 Subpart B				
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: 5
Attachment 2: EUT Test Photographs	Number of Pages: 2
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 are listed as the attached data.

All the tests were carried out with the EUT in normal operation, which was defined as:

Mode 1: 10Mbps

### **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:  $< \pm 2.0$  dB
- Uncertainty in the field strength measured:  $< \pm 4.0$  dB

## CONDUCTED EMISSION DATA

Date of Test : Jan.15, 2001 EUT : HomeLink Phoneline 10M  
Network CardBus PC Card

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

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level Line1 dBuV	Measurement Level Line1 dBuV	Limits dBuV
0.200	0.02	0.10	48.47	48.59	63.60
0.266	0.03	0.10	41.13	41.26	61.23
0.331	0.04	0.10	34.85	34.99	59.43
0.399	0.05	0.10	32.31	32.46	57.88
4.381	0.19	0.16	27.79	28.15	56.00
15.995	0.33	0.37	24.93	25.63	60.00

**Average :**

0.200	0.02	0.10	37.50	37.62	53.61
0.266	0.03	0.10	32.10	32.23	51.24
0.331	0.04	0.10	27.80	27.94	49.43
0.399	0.05	0.10	27.30	27.45	47.87
4.381	0.19	0.16	18.60	18.96	46.00
15.995	0.33	0.37	18.10	18.80	50.00

**Remarks :**

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

## CONDUCTED EMISSION DATA

Date of Test : Jan.15, 2001 EUT : HomeLink Phoneline 10M  
 Network CardBus 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	47.33	47.45	63.58
0.267	0.03	0.10	38.39	38.52	61.22
0.332	0.04	0.10	34.03	34.17	59.40
0.399	0.05	0.10	31.93	32.08	57.88
4.116	0.19	0.16	28.07	28.42	56.00
15.265	0.32	0.35	25.95	26.62	60.00

**Average :**

0.201	0.02	0.10	37.30	37.42	53.57
0.267	0.03	0.10	31.10	31.23	51.21
0.332	0.04	0.10	27.80	27.94	49.40
0.399	0.05	0.10	28.40	28.55	47.87
4.116	0.19	0.16	19.70	20.05	46.00
15.265	0.32	0.35	19.20	19.87	50.00

**Remarks :**

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

## RADIATED EMISSION DATA

Date of Test : Jan.15, 2001 EUT : HomeLink Phoneline 10M Network CardBus PC Card

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

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Measurement Horizontal	Margin	Limit	Ant	Turn
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	cm	deg
128.003	2.34	11.69	0.00	5.91	19.94	10.06	30.00	398	15
191.998	2.95	9.00	0.00	3.15	15.11	14.89	30.00	398	0
*223.994	3.31	9.78	0.00	11.45	24.54	5.46	30.00	398	141
240.029	3.45	11.32	0.00	6.87	21.64	15.36	37.00	398	202
287.999	3.83	13.11	0.00	9.85	26.78	10.22	37.00	300	132
319.998	4.12	13.59	0.00	0.77	18.49	18.51	37.00	300	23

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 : Jan.15, 2001 EUT : HomeLink Phoneline 10M  
 Network CardBus PC Card

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

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Measurement Vertical	Margin	Limit	Ant	Turn
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	cm	deg
48.004	1.47	8.03	0.00	13.91	23.42	6.58	30.00	100	74
64.003	1.65	6.58	0.00	11.51	19.74	10.26	30.00	100	108
127.999	2.34	11.83	0.00	9.67	23.85	6.15	30.00	100	202
*191.999	2.95	8.88	0.00	6.49	18.33	11.67	30.00	100	37
224.003	3.31	9.65	0.00	7.65	20.61	9.39	30.00	100	15
287.996	3.83	13.17	0.00	4.23	21.23	15.77	37.00	100	135

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