



# Test Report

For

**Applicant** : **AboCom Systems, Inc.**  
**Equipment Type** : **HomeNet to Ethernet Bridge**  
**Model** : **HCA2000, HB2000, HL2000**  
**FCC ID** : **MQ4HXX2000**

**Report No. : 001H004FI**



## 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), VCCI, 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 : HomeNet to Ethernet Bridge  
Model : HCA2000, HB2000, HL2000  
FCC ID. : MQ4HXX2000  
Measurement Standard : CISPR 22/1994  
Measurement Procedure : ANSI C63.4 /1992  
Operation Voltage : 120Vac/60Hz  
Classification : Class B  
Test Result : Complied  
Test Date : Jan.07, 1999  
Report No. : 001H004FI



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: Peter 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 Road II, Science-Based Industrial Park, Hsin-Chu , Taiwan, R.O.C.
Equipment Type	: HomeNet to Ethernet Bridge
Model	: HCA2000, HB2000, HL2000
FCC ID	: MQ4HXX2000
Operation Voltage	: 120Vac/60Hz
TEL Cable	: Non-shielded, 1.8m×1
UTP	: Non-shielded, 0.9m×1
Power Adapter	: M/N:DSA-0151A-05A
	Manufacturer: DEE VAN EUT
	Power Cord: DC 5V/2.4A, Non-shielded, 1.8 m×1
	BSMI No: 3872A604

### Remark :

- 1.EUT is a HomeNet to Ethernet Bridge, with 10Mbps Lan port and 1Mbps HomePNA port.
2. HB2000:bridge for Ethernet and Home net.  
HCA2000:Bridge and NAT router, DHCP server is implemented at the Home net segment.  
HCHL2000: Bridge and NAT router, DHCP server is implemented at the Ethernet segment.
- 3.QuieTek had verified the construction and formation of these model in typical operation , then shown in the this 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 Host Personal Computer

Model Number : P2L97  
Serial Number : 92M4Y00777  
FCC ID : DoC  
Manufacturer : ASUS  
Power Cord : Non-Shielded, 1.8m

#### HomeNet to Ethernet Bridge(EUT)

Model Number : HCA2000, HB2000, HL2000  
Serial Number : N/A  
FCC ID : MQ4HXX2000  
Manufacturer : AboCom  
TEL Cable : Non-Shielded, 1.8m

### 1.2.2 Monitor

Model Number : CM752ET-311  
Serial Number : T8F005799  
FCC ID : DoC  
Manufacturer : HITACHI  
Data Cable : Shielded, 1.5m  
Power Cord : Shielded, 1.8m

### 1.2.3 Keyboard

Model Number : 6311-TW4C  
Serial Number : 916590704C91F24346  
FCC ID : DoC  
Manufacturer : ACER  
Data Cable : Shielded, 1.8m

### 1.2.4 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



### 1.2.5 Printer

Model Number : C2642A  
Serial Number : MY75N1D2BC  
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-S35  
Serial Number : LZA75102600  
FCC ID : DZL211029  
Manufacturer : Logitech  
Data Cable : Shielded, 1.8m

### 1.2.7 Mouse(USB)

Model Number : M-UB48  
Serial Number : LTC74800118  
FCC ID : DZL211137  
Manufacturer : Logitech  
Data Cable : Shielded, 1.8m

### 1.2.8 Video Camera

Model Number : Vcam 3X  
Serial Number : N/A  
FCC ID : DoC  
Manufacturer : Mustek  
Data Cable (USB) : Shielded, 1.5m

### 1.2.9 RS232: Shielded, 1.8m×1

### 1.2.10 Lan Cable: Non-Shielded, 3.0m×1

### 1.2.11 TEL Cable: Non-Shielded, 1.5m×1



## Partner PC

### 1.2.12 Host Personal Computer

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

### 1.2.13 Monitor

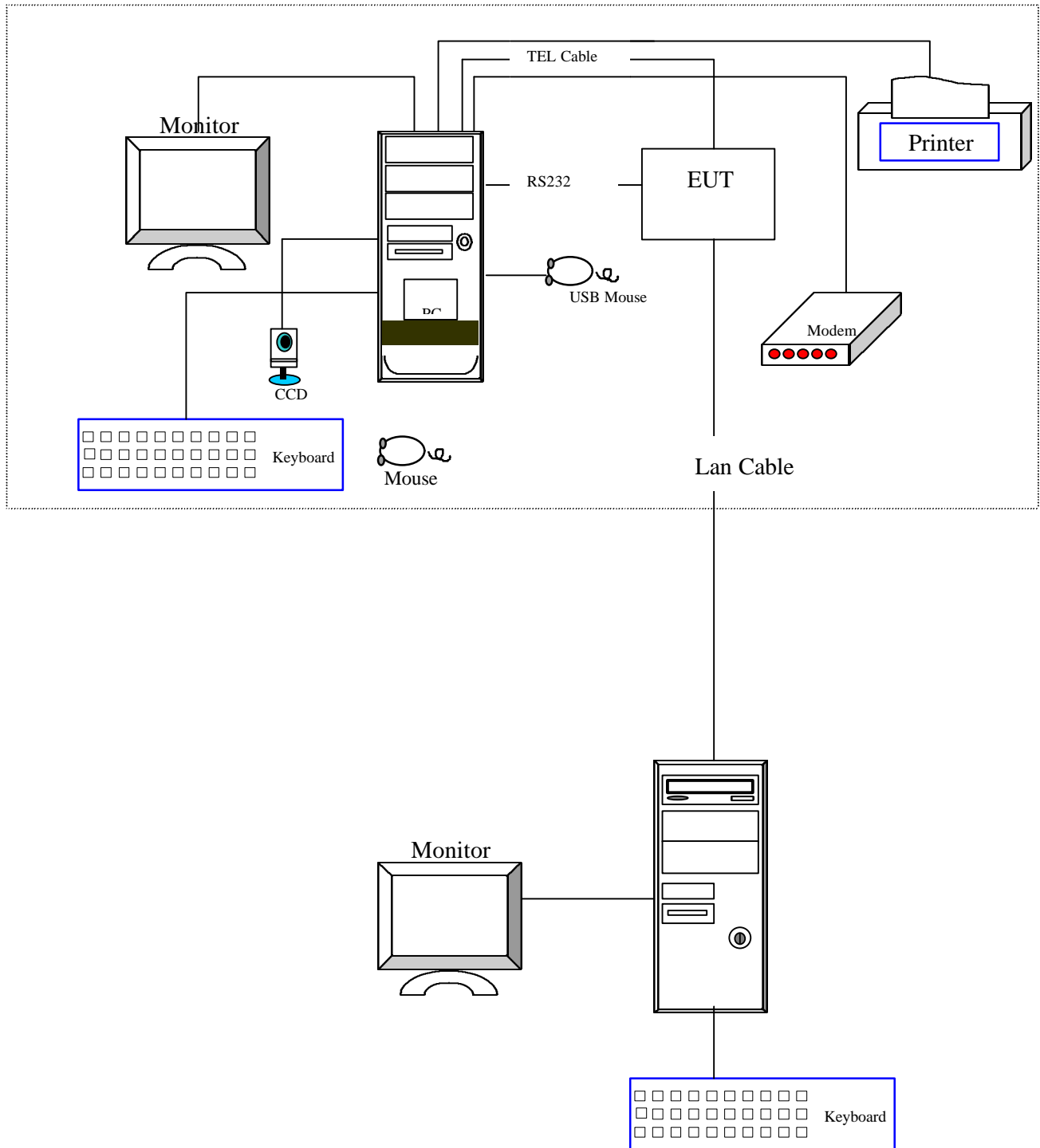
Model Number : CM752ET-311  
Serial Number : T8F006364  
FCC ID : DoC  
Manufacturer : HITACHI  
Data Cable : Shielded, 1.5m  
Power Cord : Shielded, 1.8m

### 1.2.14 Keyboard

Model Number : 6311-TW4C  
Serial Number : 916590704C91F24345  
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 Boot the PC from Hard Disk .
- 1.4.4 Data will communicate between two lan card in PC through the Homenet to Ethernet Bridge .
- 1.4.5 The host computer's monitor will show the transmitting and receiving characteristics when the communication is success.
- 1.4.6 Repeat the above procedure 1.4.4 to 1.4.6

## 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

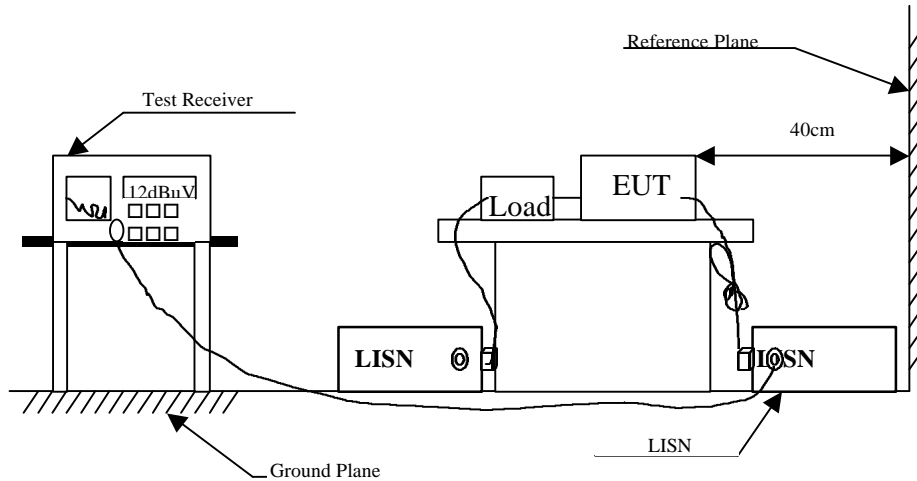
### 2.1 Test Equipment List

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, 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	MHz	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

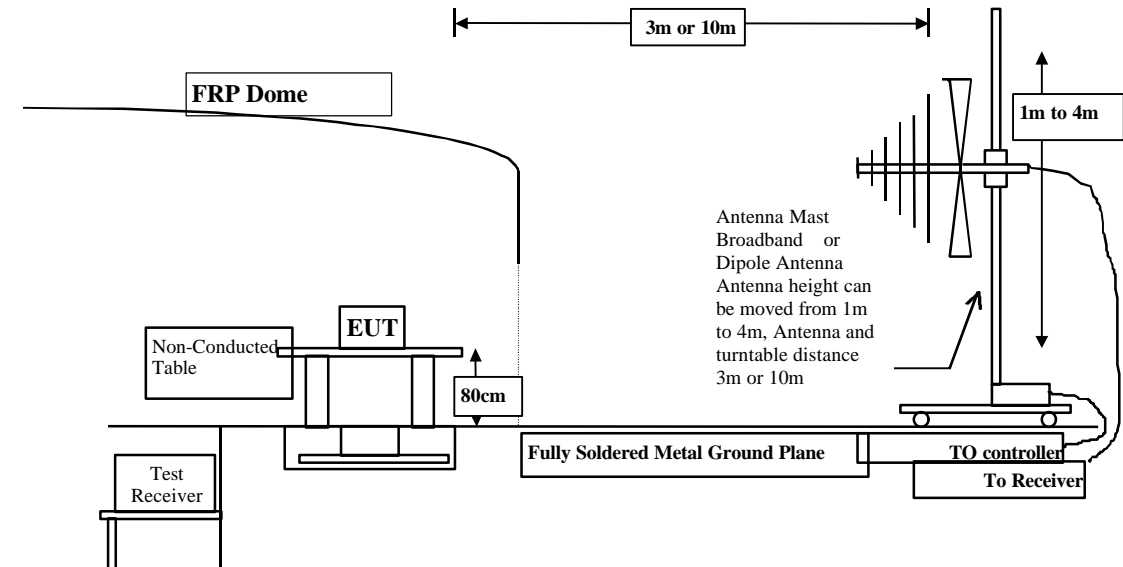
#### 3.1 Test Equipment

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 MHz	Class A		Class B		Frequency	Class A		Class B	
	Distance (m)	dBuV/m	Distance (m)	dBuV/m		uV	dBuV	uV	dBuV
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) = 20 log RF Line Voltage (uV)

### 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: 5





## 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 : Normal Operation(HCA2000)

### 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. 07, 1999 EUT : HomeNet to Ethernet Bridge

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
0.239	0.02	0.10	48.30	48.42	62.14
0.597	0.07	0.10	37.42	37.59	56.00
0.714	0.08	0.10	38.92	39.10	56.00
1.068	0.10	0.10	40.61	40.82	56.00
*2.044	0.14	0.13	43.62	43.90	56.00
3.896	0.18	0.16	40.70	41.04	56.00

**Average:**

0.239	0.02	0.10	46.50	46.62	52.13
0.597	0.07	0.10	28.60	28.77	46.00
0.714	0.08	0.10	28.60	28.78	46.00
1.068	0.10	0.10	26.30	26.51	46.00
2.044	0.14	0.13	26.30	26.58	46.00
3.896	0.18	0.16	16.80	17.14	46.00

**Remarks :**

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



## CONDUCTED EMISSION DATA

Date of Test : Jan. 07, 1999 EUT : HomeNet to Ethernet Bridge  
 Test Mode : Mode 1 Detect Mode : Quasi-Peak & Average

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level Line2 dBuV	Measurement Level Line2 dBuV	Limits dBuV
0.238	0.02	0.10	47.63	47.75	62.16
0.599	0.07	0.10	41.02	41.19	56.00
0.710	0.08	0.10	41.76	41.94	56.00
1.071	0.10	0.10	43.70	43.91	56.00
*2.276	0.15	0.14	46.58	46.87	56.00
3.598	0.18	0.16	45.45	45.79	56.00

**Average:**

0.238	0.02	0.10	45.40	45.52	52.17
0.599	0.07	0.10	34.40	34.57	46.00
0.710	0.08	0.10	29.90	30.08	46.00
1.071	0.10	0.10	31.30	31.51	46.00
2.276	0.15	0.14	29.70	29.99	46.00
3.598	0.18	0.16	28.60	28.94	46.00

Remarks :

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



## RADIATED EMISSION DATA

Date of Test : Jan. 07, 1999 EUT : HomeNet to Ethernet Bridge  
 Test Mode : Mde 1 Test Site : No. 1 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
200.000	2.78	9.30	0.00	10.10	22.18	7.82	30.00	401	90
240.000	3.17	11.32	0.00	8.70	23.19	13.81	37.00	401	65
360.000	4.07	14.70	0.00	11.47	30.24	6.76	37.00	401	45
420.000	4.38	16.52	0.00	6.40	27.30	9.70	37.00	312	66
*600.013	5.31	18.85	0.00	10.68	34.84	2.16	37.00	131	87
720.010	5.94	19.71	0.00	8.55	34.20	2.80	37.00	175	124

**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. 07, 1999 EUT : HomeNet to Ethernet Bridge  
 Test Mode : Mode 1 Test Site: No. 1 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
60.000	1.44	6.00	0.00	10.74	18.18	11.82	30.00	103	122
200.000	2.78	9.07	0.00	9.19	21.05	8.95	30.00	103	12
300.000	3.76	13.56	0.00	5.30	22.61	14.39	37.00	103	13
*360.000	4.07	15.48	0.00	10.10	29.64	7.36	37.00	103	140
600.015	5.31	18.42	0.00	5.43	29.17	7.83	37.00	401	88
700.000	5.83	18.69	0.00	2.32	26.84	10.16	37.00	401	89

**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

