

FCC TEST REPORT

for

PART 15, SUBPART B CLASS B

Equipment : DUAL SPEED 4 PORTS HUB

MODEL NO. : DFE-904, ETHER-DH4

F C C I D : KA2ED4904H1

Filing Type : Original Grant

APPLICANT : D-LINK CORPORATION

2F, No. 233-2, Pao-Chiao Rd., Hsin-Tien,
Taipei, Taiwan, R.O.C.

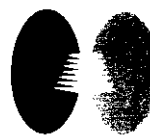
- The test result refers exclusively to the test presented test model / sample.
- Without the written authorization of the test lab., the Test Report may not be copied.

SPORTON INTERNATIONAL INC.

6F, No. 106, Hsin Tai Wu Rd., Sec. 1, Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

TABLE OF CONTENT

SECTION TITLE	PAGE
CERTIFICATE OF COMPLIANCE	3
1. GENERAL DESCRIPTION OF EQUIPMENT UNDER TEST	4
1.1. APPLICANT	4
1.2. MANUFACTURER	4
1.3. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	4
1.4. FEATURE OF EQUIPMENT UNDER TEST	4
2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST	5
2.1. TEST MANNER	5
2.2. DESCRIPTION OF TEST SYSTEM	5
2.3. CONNECTION DIAGRAM OF TEST SYSTEM	8
3. TEST SOFTWARE	9
4. GENERAL INFORMATION OF TEST	10
4.1. TEST FACILITY	10
4.2. STANDARD FOR METHODS OF MEASUREMENT	10
4.3. TEST IN COMPLIANCE WITH	10
4.4. FREQUENCY RANGE INVESTIGATED	10
4.5. TEST DISTANCE	10
5. TEST OF CONDUCTED POWERLINE	11
5.1. MAJOR MEASURING INSTRUMENTS	11
5.2. TEST PROCEDURES	12
5.3. TYPICAL TEST SETUP LAYOUT OF CONDUCTED POWERLINE	13
5.4. TEST RESULT OF AC POWERLINE CONDUCTED EMISSION	14
5.5. PHOTOGRAPHS OF CONDUCTED POWERLINE TEST CONFIGURATION	15
6. TEST OF RADIATED EMISSION	17
6.1. MAJOR MEASURING INSTRUMENTS	17
6.2. TEST PROCEDURES	18
6.3. TYPICAL TEST SETUP LAYOUT OF RADIATED EMISSION	19
6.4. TEST RESULT OF RADIATED EMISSION	20
6.5. PHOTOGRAPHS OF RADIATED EMISSION TEST CONFIGURATION	21
7. ANTENNA FACTOR AND CABLE LOSS	22
8. LIST OF MEASURING INSTRUMENTS USED	23



CERTIFICATE OF COMPLIANCE

for

FCC PART 15, SUBPART B CLASS B

Equipment : DUAL SPEED 4 PORTS HUB

MODEL NO. : DFE-904, ETHER-DH4

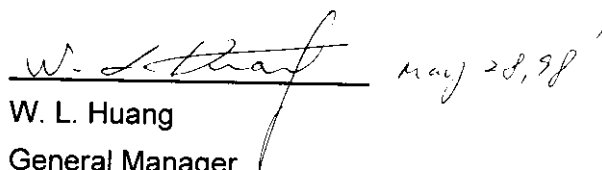
F C C I D : KA2ED4904H1

APPLICANT : D-LINK CORPORATION

2F, No. 233-2, Pao-Chiao Rd., Hsin-Tien,
Taipei, 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 APR. 28, 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

D-LINK CORPORATION

2F, No. 233-2, Pao-Chiao Rd., Hsin-Tien,
Taipei, Taiwan, R.O.C.

1.2. MANUFACTURER

Same as item 1.1.

1.3. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

EQUIPMENT : DUAL SPEED 4 PORTS HUB

MODEL NO. : DFE-904, ETHER-DH4

FCC ID : KA2ED4904H1

TRADE NAME : D-LINK

TP DATA CABLE : Non-shielded

Power Supply Type: Linear

1.4. FEATURE OF EQUIPMENT UNDER TEST

- Compatible with the IEEE 802.3 10 Base-T ethernet and 802.3u 100Base-TX fast ethernet industry standards for interoperability with other ethernet/fast ethernet network devices.
- Ethernet connections support Category 3 or better twisted-pair cables.
- Four RJ-45 ports for connection stations to the network.
- LED indicators for power, collisions, link, network activity, switch capability, partitioning status, operating speed and network utilization.
- Auto-partitioning for network protection.
- Data collision detection and handling.
- Preamble regeneration, signal retiming.

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, HP monitor, HP printer, D-LINK HUB and ACEEX modem were connected to the LEO PC.
- c. Using the twisted pair cable to connect the EUT and workstation which is installed with the other ethernet lan card.
- d. Frequency range investigated: Conduction 450 KHz to 30 MHz, Radiation 30 MHz to 1000 MHz.

2.2. DESCRIPTION OF TEST SYSTEM

Support Device 1. --- MODEM (ACEEX)

FCC ID : IFAXDM1414
Model No. : DM1414
Serial No. : SP0025
Data Cable : Shielded, 360 degree via metal backshells.
Power Supply Type : Linear

Support Device 2. --- PRINTER (HP)

FCC ID : B94C2642X
Model No. : DESKJET 400
Serial No. : SP0003
Data Cable : Shielded, 360 degree via metal backshells.
Power Supply Type : Linear

Support Device 3. --- MONITOR (HP)

FCC ID : ACJ93312116
Model No. : D2807A
Serial No. : SP1046
Data Cable : Shielded, 360 degree via metal backshells.
Power Supply Type : Switching
Power Cord : Non-shielded

Support Device 4. --- KEYBOARD (DELL)

FCC ID : GYUR92SK
Model No. : AT101
Serial No. : SP1014
Data Cable : Shielded, 360 degree via metal backshells.

Support Device 5. --- PERSONAL COMPUTER (LEO)

FCC ID : N/A
Model No. : P55T2P4
Serial No. : SP1039
Data Cable : Shielded, 360 degree via metal backshells.
Power Supply Type : Switching
Power Cord : Shielded

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

Support Device 6. --- ETHERNET LAN CARD (D-LINK)

FCC ID : KA2APC220E1
Model No. : DE-220CT
BNC Data Cable : Shielded
TP Data Cable : Non-shielded

SPORTON International Inc.

TEL : 886-2-2696-2468

FAX : 886-2-2696-2255

FCC TEST REPORT

REPORT NO. : F841709

Support Device 7. --- MOUSE (PRIMAX)

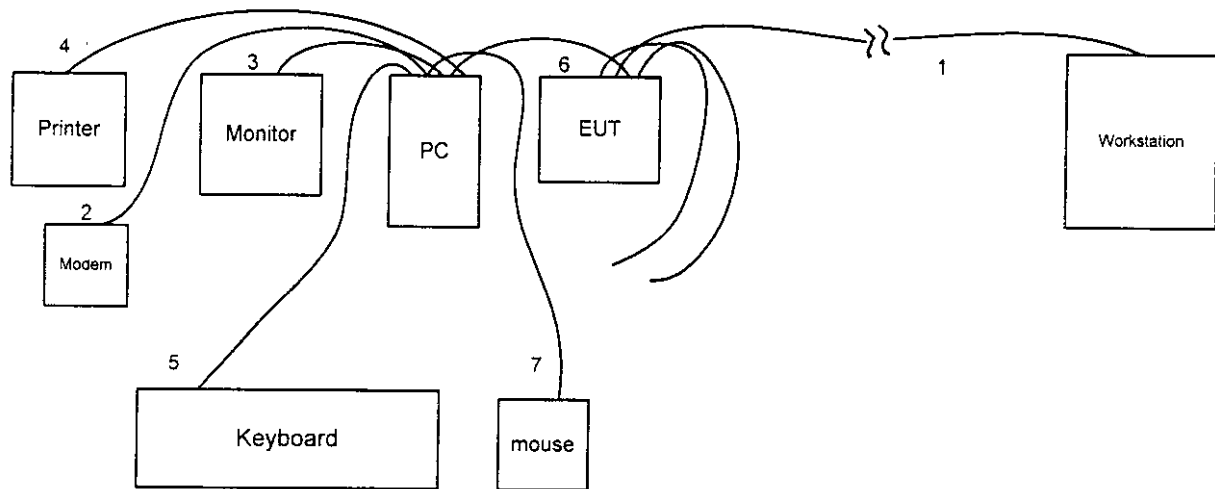
FCC ID :EMJMUSJQ

Model No. :MUS9J

Serial No. :SP1038

Data Cable :Non-shielded

2.3. CONNECTION DIAGRAM OF TEST SYSTEM



1. The twisted pair cable is connected to the workstation .
2. The I/O cable is connected to the support device 1.
3. The I/O cable is connected to the support device 3.
4. The I/O cable is connected to the support device 2.
5. The I/O cable is connected to the support device 4.
6. The I/O cable is connected to the EUT.
7. The I/O cable is connected to the support device 7.

Remark: The workstation PC, FCC ID:HCJVECTRA486-XX.

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 "TEST200J.EXE"
 - b. For workstation: In DOS mode, running the batch file "TEST200J.EXE"
-
- a. Turn on the power of all equipment.
 - b. The PC transmits the "H" character to the other PC.
 - c. The monitor then displaying the "H" characters on the screen continuously and repeatly.
 - 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.

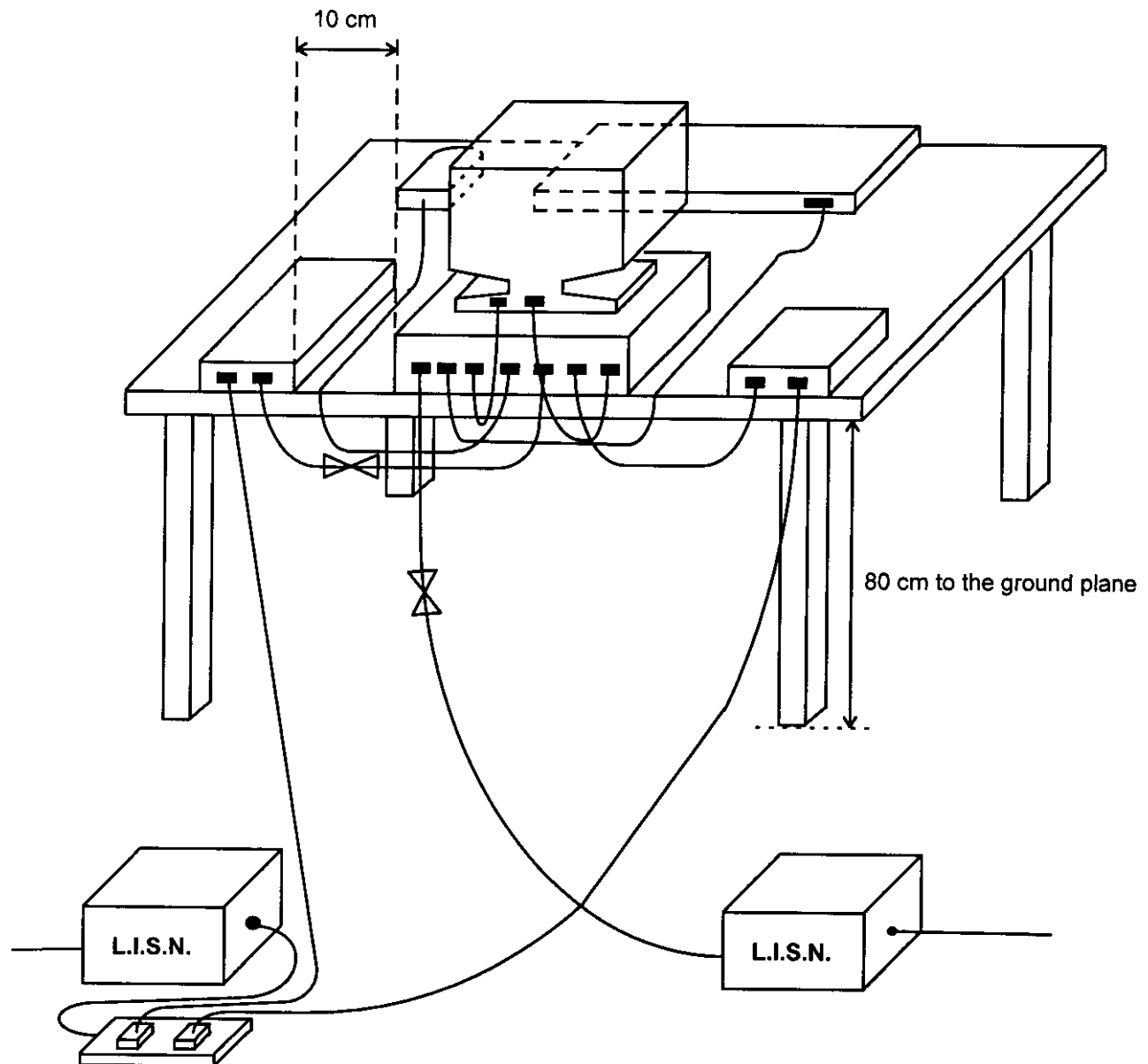
Conducted Emissions were measured from 450 KHz to 30 MHz with a bandwidth of 9 KHz on the 115 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown 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.

- Test Receiver HP85462A
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 receiver 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.

5.3. TYPICAL TEST SETUP LAYOUT OF CONDUCTED POWERLINE



5.4. TEST RESULT OF AC POWERLINE CONDUCTED EMISSION

- Frequency Range of Test : from 0.45 MHz to 30 MHz
- Temperature :26 °C
- Relative Humidity :71% RH
- All emissions not reported here are more than 10 dB below the prescribed limit.
- Measuring Mode :TWISTED PAIR MODE
- Test Date : APR. 28, 1998

The Conducted Emission was passed at minimum margin NEUTRAL 13.36MHz / 45.00dBuV.

Frequency Line / Neutral		Meter Reading		Limits		Margin
(MHz)		(dBuV)	(uV)	(dBuV)	(uV)	(dB)
0.45	L	41.90	124.45	48.00	251.19	-6.10
13.42	L	43.80	154.88	48.00	251.19	-4.20
26.61	L	42.60	134.90	48.00	251.19	-5.40
13.36	N	45.00	177.83	48.00	251.19	-3.00
18.91	N	43.70	153.11	48.00	251.19	-4.30
26.61	N	43.50	149.62	48.00	251.19	-4.50

Test Engineer :



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 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

- RF Preselector
 - Attenuation 0 dB
 - RF Gain 20 dB
 - Signal Input Input 2 (for 20 MHz to 2 GHz)

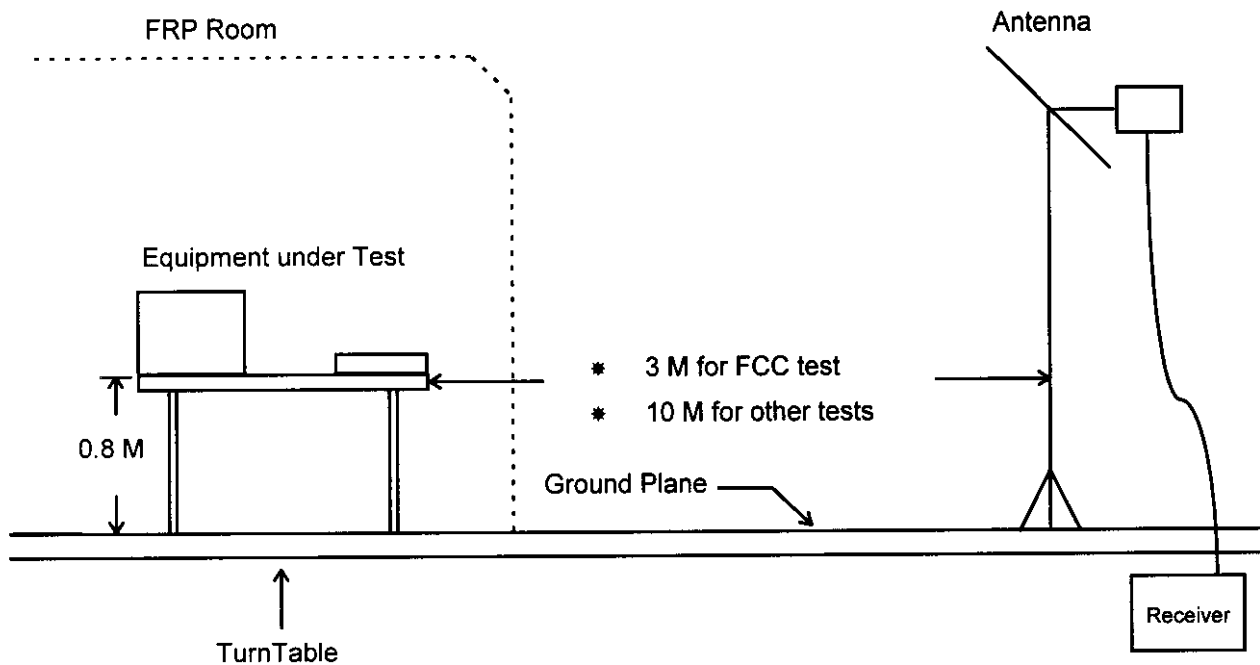
- Spectrum Analyzer 8568B
 - Attenuation 0 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1000 MHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input Input 1 (for 100KHz to 1.5 GHz)

- Quasi-Peak Adapter
 - 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 (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 15.109
- Frequency Range of Test : from 30 MHz to 1000 MHz
- Test Distance : 3 M
- Temperature : 25 °C
- Relative Humidity : 68% RH
- Measuring Mode : TWISTED PAIR MODE
- Test Date : APR. 17, 1998
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Sample Calculation at 176.70MHz
Corrected Reading = 12.764+ 2.27+ 16.40= 31.43(dBuV/m)

The Radiated Emission test was passed at

350.40MHz / 41.34dBuV (Horizontal)

Antenna Height 1.2Meter , Turntable Degree 175 °.

Frequency (MHz)	Polarity	Antenna Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV)	(uV)	Emission (dBuV)	Level (uV)	Margin (dB)
50.70	V	2.50	1.02	29.40	40.00	100	32.91	44.21	-7.09
150.00	V	11.91	2.01	20.60	43.50	150	34.52	53.21	-8.98
250.40	V	16.15	2.56	21.75	46.00	200	40.46	105.44	-5.54
344.80	H	19.37	3.22	15.50	46.00	200	38.10	80.35	-7.90
350.40	H	19.66	3.25	18.43	46.00	200	41.34	116.68	-4.66
176.70	H	12.76	2.27	16.40	43.50	150	31.43	37.28	-12.07

Test Engineer :

Terry Chang

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.	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
Spectrum Analyzer (Site 1)	HP	8568B	2732A04100	100Hz - 1500GHz	Jun 17, 1997	R
Quasi-peak Adapter (site 1)	HP	85650A	2811A01116	9KHz -1 GHz	Jun. 17, 1997	R
Amplifier (Site 1)	HP	8447D	2944A08291	0.1 MHz -1.3 GHz	Nov. 12, 1997	R
Bilog Antenna (Site 1)	CHASE	CBL6111	1378	30 MHz -1000 MHz	Aug. 11, 1997	R
Half-wave dipole antenna	EMCO	3121C	9705-1285	28M-1GHZ	May. 19, 1997	R
Turn Table (site 1)	EMCO	1060-1.211	9508-1805	0 ~ 360 degree	N/A	R
Antenna Mast (site 1)	EMCO	1051-1.2	9502-1868	1 m- 4 m	N/A	R

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