FCC TEST REPORT

for

PART 15, SUBPART B CLASS B

EQUIPMENT : 17" COLOR MONITOR

MODEL NO. : C706-D

FCC ID : IQX98C1770

FILING TYPE : Original Grant

APPLICANT : **SHAMROCK TECHNOLOGY CO., LTD.**
No. 3, Chung-Shan Rd., Tu-Cheng Industrial District,
Tu-Cheng City, Taipei Hsien, 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

1. GENERAL DESCRIPTION OF EQUIPMENT UNDER TEST

1.1. APPLICANT

SHAMROCK TECHNOLOGY CO., LTD.
No. 3, Chung-Shan Rd., Tu-Cheng Industrial District,
Tu-Cheng City, Taipei Hsien, Taiwan, R.O.C.

1.2. MANUFACTURER

Same as 1.1

1.3. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

EQUIPMENT : 17" COLOR MONITOR

MODEL NO. : C706-D

TRADE NAME : SHAMROCK

DATA CABLE : Shielded

(**Remark :** A ferrite core is added on the video cable at PC end.)

POWER SUPPLY TYPE : Switching

POWER CORD : Non-shielded

1.4. FEATURE OF EQUIPMENT UNDER TEST

CRT	17" (15.7" viewable image), 0.28/0.26 mm (option) dot pitch, 90° deflection, dark tint, F.S.T. double focus, ARASC coating
Resolution	1280 × 1024 max. (depends on video card)
Input / Video Sync	Analog : 0.7 Vp-p, 75 ohm, RGB (+) Horizontal : 31.5 – 69 KHz. Vertical : 60 – 85 Hz.
Video Response	110 MHz norminal
Power	110 - 240VAC, 60/50 Hz, 2.5A (max.) Consumption : 115W (max.)
Video Cable	15 pin, D-type male connector.

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 HP printer, ACEEX modem, SILITEK keyboard, KYE mouse and EUT were connected to the FIC P.C. for EMI test.

c. The following display resolution were investigated during the compliance test:

1. Horizontal frequency (640 x 480 to 1280 x 1024, 31.5KHz to 69.0KHz)
2. Vertical frequency (60Hz to 85Hz)

d. According to the above tests, we listed the following display modes as the worst cases:

1. 1280 x 1024 (Non-interlanced 64.0KHz), refresh rate 60Hz.
2. 1024 x 768 (69.0KHz), refresh rate 85Hz.

e. Frequency range investigated: Conduction 450 KHz to 30 MHz, Radiation 30 MHz to 2000MHz.

2.2. DESCRIPTION OF TEST SYSTEM

Support Device 1. --- KEYBOARD (SILITEK)

FCC ID	: GYUM99SK
Model No.	: SK9001AS2U
Serial No.	: SP1008
Data Cable	: Shielded, 360 degree via metal backshells, 2.5m

Support Device 2. -- MODEM (ACEEX)

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear, AC Adapter
Power Cord	: Non-shielded
Serial No.	: SP1019
Data Cable	: Shielded, 1.75m

Support Device 3. --- PRINTER (HP)

FCC ID	: DSI6XU2225
Model No.	: 2225C
Serial No.	: SP1015
Data Cable	: Shielded, 360 degree via metal backshells, 2.0m
Power Supply Type	: Linear

Support Device 4. -- PS/2 MOUSE (KYE)

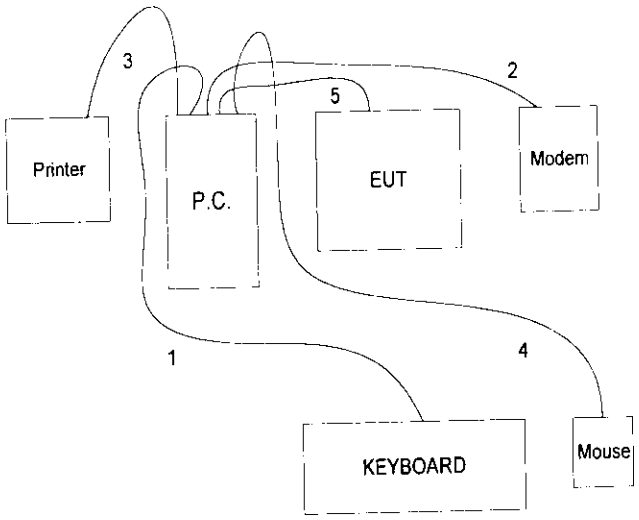
FCC ID	: FSUGMZFC
Model No.	: NETMOUSE
Serial No.	: SP1034
Data Cable	: Non-shielded, 1.75m

Support Device 5. --- P.C. (FIC)

FCC ID	: N/A
Model No.	: P55T2P4
Serial No.	: SP1003
Data Cable	: Shielded
Power Cord	: Non-hielded
Power Supply Type	: Switching

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

2.3. CONNECTION DIAGRAM OF TEST SYSTEM



1. The I/O cable is connected to the support device 1.
2. The I/O cable is connected to the support device 2.
3. The I/O cable is connected to the support device 3.
4. The I/O cable is connected to the support device 4.
5. The I/O cable is connected to the EUT.

3. TEST SOFTWARE

An executive program, EMITEST.EXE under WIN 3.11, which generate a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

a. Turn on the power of all equipment.
b. The PC reads the test program from the floppy disk drive and runs it.
c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
e. The PC sends " H " messages to the modem.
f. The PC sends " H " messages to the internal Hard Disk, and 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. 3, Lane 238, Kang Lo Street, Nei Hwu District, Taipei 11424, Taiwan, R.O.C.

TEL : 886-2-2631-4739, FAX : 886-2-2631-9740

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 2000 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

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.

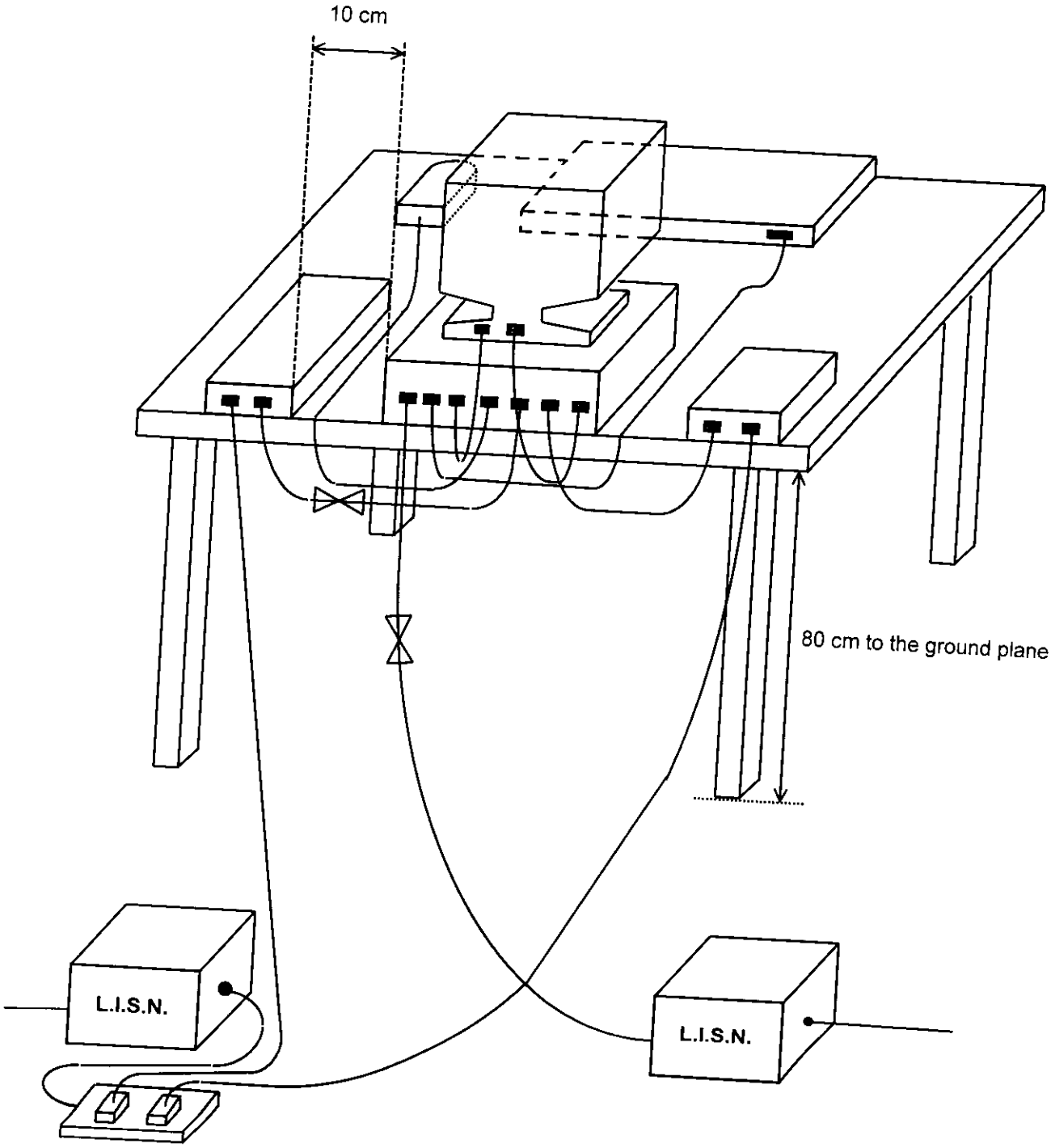
f. Both sides of AC line were checked for maximum conducted interference.

g. The frequency range from 450 KHz to 30 MHz was searched.

h. Set the test-receiver system (HP receiver 8546A) 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
- All emissions not reported here are more than 10 dB below the prescribed limit.
- Temperature : 24℃
- Relative Humidity : 65 % RH
- Test Mode : **1280 × 1024, 60Hz, 64K**
- Test Date : June 11, 1998

The Conducted Emission test was passed at Neutral 0.48 MHz / 38.90 dBuV.

Frequency	Line /	Meter Reading		Limits		Margin
(MHz)	Neutral	(dBuV)	(uV)	(dBuV)	(uV)	(dB)
0.55	L	33.50	47.32	48.00	251.19	-14.50
0.75	L	36.70	68.39	48.00	251.19	-11.30
15.69	L	38.00	79.43	48.00	251.19	-10.00
0.48	N	38.90	88.10	48.00	251.19	-9.10
0.88	N	36.70	68.39	48.00	251.19	-11.30
12.85	N	38.70	86.10	48.00	251.19	-9.30

Test Engineer : Louis Lin

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/8594a

Attenuation	0 dB
Start Frequency	30 MHz
Stop Frequency	2000 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	Input 1 (for 9KHz to 2.9GHz)

- 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.

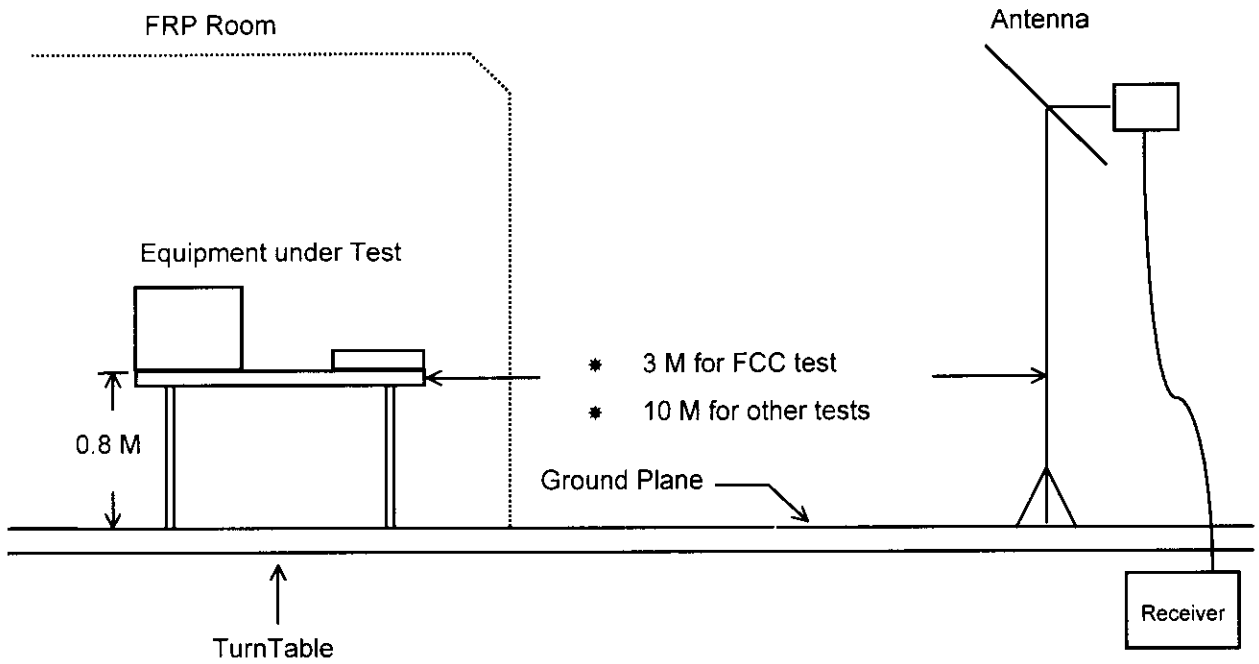
d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.

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 2000 MHz
- Test Distance : 3 M
- Temperature : 28℃
- Relative Humidity : 68% RH
- Test Mode : **1280 × 1024, 60Hz, 64K**
- Test Date : June 04, 1998

- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Sample Calculation at 109.09 MHz

  Corrected Reading = 9.95 + 1.70 + 24.95 = 36.60 (dBuV/m)

The Radiated Emission test was passed at

109.09 MHz / 36.60 dBuV (Vertical)

Antenna Height 1.0 Meter , Turntable Degree 170°.

Frequency		Antenna	Cable	Reading	Limits		Emission	Level	Margin
	Polarity	Factor	Loss						
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)
109.09	V	9.95	1.70	24.95	43.50	150	36.60	67.61	-6.90
195.20	V	13.79	2.35	17.96	43.50	150	34.10	50.70	-9.40
207.20	V	14.43	2.44	11.40	43.50	150	28.27	25.91	-15.23
195.20	H	13.79	2.35	13.66	43.50	150	29.80	30.90	-13.70
229.60	H	15.93	2.55	10.58	46.00	200	29.05	28.35	-16.95
466.40	H	21.46	3.83	9.70	46.00	200	35.00	56.23	-11.00

Test Engineer : Tony Chen

6.4.1. TEST RESULT OF RADIATED EMISSION

- Equipment meets the technical specifications of 15.109
- Frequency Range of Test : from 30 MHz to 2000 MHz
- Test Distance : 3 M
- Temperature : 28℃
- Relative Humidity : 68% RH
- Test Mode : **1024 × 768, 85Hz, 69K**
- Test Date : June 04, 1998

- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Sample Calculation at 51.40 MHz

  Corrected Reading = 2.71 + 1.10 + 26.51 = 30.32 (dBuV/m)

The Radiated Emission test was passed at

66.60 MHz / 31.46 dBuV (Vertical)

Antenna Height 1.0 Meter , Turntable Degree 144 .

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Limits (uV/m)	Emission (dBuV/m)	Level (uV/m)	Margin (dB)
51.40	V	2.71	1.10	26.51	40.00	100	30.32	32.81	-9.68
66.60	V	5.08	1.39	24.99	40.00	100	31.46	37.41	-8.54
207.20	V	14.43	2.44	15.51	43.50	150	32.38	41.59	-11.12
117.70	H	10.32	1.85	18.44	43.50	150	30.61	33.92	-12.89
136.10	H	11.19	1.91	19.12	43.50	150	32.22	40.83	-11.28
208.00	H	14.47	2.44	13.07	43.50	150	29.98	31.55	-13.52

Test Engineer : Nory Chiu

7. ANTENNA FACTOR AND CABLE LOSS

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	-1.91	0.90
35	-0.50	0.92
40	0.61	1.04
45	1.40	1.28
50	2.39	1.10
55	3.54	1.11
60	4.40	1.30
65	4.84	1.40
70	5.59	1.37
75	6.21	1.24
80	7.60	1.51
85	7.73	1.60
90	8.22	1.60
95	8.90	1.70
100	9.36	1.70
110	10.01	1.70
120	10.41	1.90
130	10.84	1.90
140	11.42	1.91
150	11.91	2.01
160	12.25	2.11
170	12.72	2.21
180	13.02	2.30
190	13.50	2.30
200	14.05	2.40
220	15.11	2.50
240	16.81	2.60
260	17.51	2.71
280	17.70	2.90
300	17.89	2.91
320	18.00	3.10
340	18.33	3.20
360	19.44	3.30
380	20.31	3.40
400	21.19	3.50
450	21.10	3.70
500	22.21	4.10
550	23.42	4.30
600	24.01	4.50
650	25.11	4.70
700	26.00	4.90
750	26.41	5.11
800	27.10	5.50
850	27.51	5.60
900	27.90	5.80
950	28.01	5.90

8. LIST OF MEASURING EQUIPMENT USED

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Test Receiver	R&S	ESH3	893495/013	9 KHz - 30MHz	April 13, 1998	Conduction
Test Receiver	R&S	ESVP	893610/003	20MHz - 1.3 GHz	April 13, 1998	Conduction
LISN	EMCO	3825/2	9510-2484	50 ohm / 50 μH	Nov. 29, 1997	Conduction
LISN	KYORITSU	KNW-407	8-1010-15	50 ohm / 50 μH	Nov. 10, 1997	Conduction
EMI Filter	CORCOM	MRI-2030	N/A	480VAC / 30A	N/A	Conduction
Spectrum Monitor	R & S	EZM	894987/011	N/A	April 13, 1998	Conduction
RF Preselector (site 1)	HP	85685A	2926A00951	20Hz - 1.5GHz	Jul. 19, 1997	Radiation
Spectrum Analyzer (site 1)	HP	8568B	2928A04713	100Hz - 1.5GHz	July 19, 1997	Radiation
Spectrum Analyzer display (site 1)	HP	N/A	2848A18002	N/A	Jul. 19, 1997	Radiation
Quasi-peak Adapter (site 1)	HP	85650A	2811A01285	9KHz -1 GHz	Jul. 19, 1997	Radiation
Bilog Antenna (1)	CHASE	CBL6112A	2296	30MHz - 2GHz	Jul. 24, 1997	Radiation
Half-wave dipole antenna (1)	EMCO	3121C	8912-496	20MHz - 1GHz	Aug. 12, 1997	Radiation
Turn Table	EMCO	1060-1.211	9507-1805	0 ~360 degree	N/A	Radiation
Antenna Mast	EMCO	1051-1.2	9502-1868	1 m - 4 m	N/A	Radiation