

FCC TEST REPORT

for

CISPR PUB. 22 Class B

Equipment : USB 4 PORT HUB
Model No. : LW-931
FCC ID : I2CLW-931
Filing Type : Original Grant
Applicant : **LONG WELL ELECTRONICS CORP.**
4F, No. 59-1, Tsao Di Wei, Shen Keng Hsiang,
Taipei Hsien 222, 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.
- **Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.**

SPORTON International Inc.

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

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CERTIFICATE OF COMPLIANCE

for

CISPR PUB. 22 Class B

Equipment : USB 4 PORT HUB
Model No. : LW-931
FCC ID : I2CLW-931
Applicant : **LONG WELL ELECTRONICS CORP.**
4F, No. 59-1, Tsao Di Wei, Shen Keng Hsiang,
Taipei Hsien 222, Taiwan, R.O.C.

I HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was **passed CISPR PUB. 22** both radiated and conducted emission class B limits. Testing was carried out on May. 19, 1999 at **SPORTON International Inc.** LAB. in Lin Kou.

W. L. Huang
General Manager

SPORTON International Inc.

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

1. General Description of Equipment under Test

1.1. Applicant

LONG WELL ELECTRONICS CORP.
4F, No. 59-1, Tsao Di Wei, Shen Keng Hsiang,
Taipei Hsien 222, Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1.

1.3. Basic Description of Equipment under Test

Equipment : USB 4 PORT HUB
Model No. : LW-931
FCC ID : I2CLW-931
Trade Name : LONG WELL ELECTRONICS CORP.
USB cable : Shielded, 1.8 m
Power Supply Type : Linear
Power Cord : N/A

1.4. Feature of Equipment under Test

- Complies with Universal Serial Bus specifications Rev.1.1
- True plug and play and hot-plugged with any USB equipped device.
- Provide four downstream ports and one upstream port.
- Autosense and autoselect between self-powered mode and bus-powered mode.
- Individually switched and managed power for each downstream port.
- Provide 500 mA for each downstream port.
- Overcurrent protection and automatic recovery on all ports
- Dimension: W130 x D79 x H24 (mm)
- Input power: DC 5V, 2.1A max
- LEDs: Power, Active, Fault
- Environment: Temperature: 0~70 , Relative humidity 10 ~90 non-condensing
- System requirements:
PowerMac or faster with USB port and MasOS with USB support
486DX66 CPU or faster PC with USB port and Microsoft Windows98 or Windows 95b

2. Test Configuration of Equipment under Test

- 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 Monitor, DELL PS/2 Keyboard, PRIMAX PS/2 Mouse, HP Printer, ACEEX Modem, BTC Keyboard and EUT were connected to the FIC PC for EMI test.
- c. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 1000MHz.

2.1. Description of Test System

Support Unit 1. -- Personal Computer (FIC)

FCC ID	: N/A
Model No.	: P2L97
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0006
Data Cable	: Shielded, 360 degree via metal backshells
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- Monitor (HP)

FCC ID	: ACJ93312116
Model No.	: D2807A
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0053
Data Cable	: Shielded, 360 degree via metal backshells, 1.7m

Support Unit 3. -- PS/2 Keyboard (DELL)

FCC ID	: GYUM92SK
Model No.	: AT101(DE8M)
Serial No.	: SP0054
Data Cable	: Shielded, 360 degree via metal backshells, 1.9m

Support Unit 4. -- PS/2 Mouse (PRIMAX)

FCC ID	: EMJMUSJQ
Model No.	: MUS9J
Serial No.	: SP0045
Data Cable	: Shielded, 360 degree via metal backshells, 1.7m

Support Unit 5. -- Printer (HP)

FCC ID : B94C2642X
Model No. : DeskJet 400
Power Supply Type : Linear
Power Cord : Non-Shielded
Serial No. : SP0048
Data Cable : Braided-Shielded, 360 degree via metal backshells, 1.35m

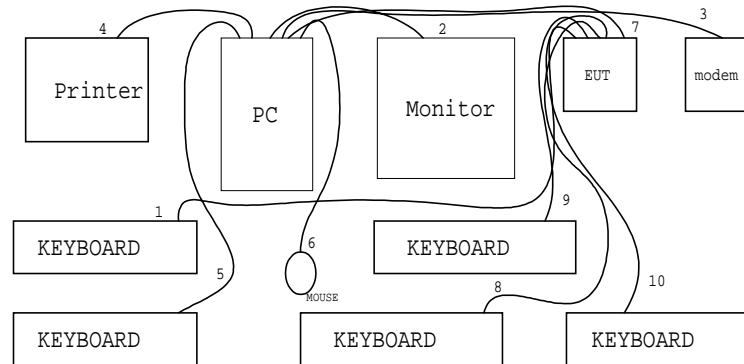
Support Unit 6. -- Modem (ACEEX)

FCC ID : IFAXDM1414
Model No. : DM1414
Power Supply Type : Linear
Power Cord : Non-Shielded
Serial No. : SP0016
Data Cable : Shielded, 360 degree via metal backshells, 1.15m

Support Unit 7. -- Keyboard (BTC)

FCC ID : E5XKBUCP10410
Model No. : 7932
Serial No. : SP0130
Data Cable : Shielded, 360 degree via metal backshells, 1.6m

2.2. Connection Diagram of Test System



1. The I/O cable is connected from EUT to the support unit 7.
2. The I/O cable is connected from PC to the support unit 2.
3. The I/O cable is connected from PC to the support unit 6.
4. The I/O cable is connected from PC to the support unit 5.
5. The I/O cable is connected from PC to the support unit 3.
6. The I/O cable is connected from PC to the support unit 4.
7. The I/O cable is connected from PC to the EUT.
8. The I/O cable is connected from EUT to the support unit 7.
9. The I/O cable is connected from EUT to the support unit 7.
10. The I/O cable is connected from EUT to the support unit 7.

3. Test Software

An executive program, EMITEST.EXE under WIN 98, which generates 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. 30-2, 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

CISPR PUB. 22 Class B

4.4. Frequency Range Investigated

- a. Conduction: from 150 kHz to 30 MHz
- b. Radiation : from 30 MHz to 1,000 MHz

4.5. Test Distance

The test distance of radiated emission from antenna to EUT is 10 M.

5. Test of Conducted Powerline

Conducted Emissions were measured from 150 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 section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

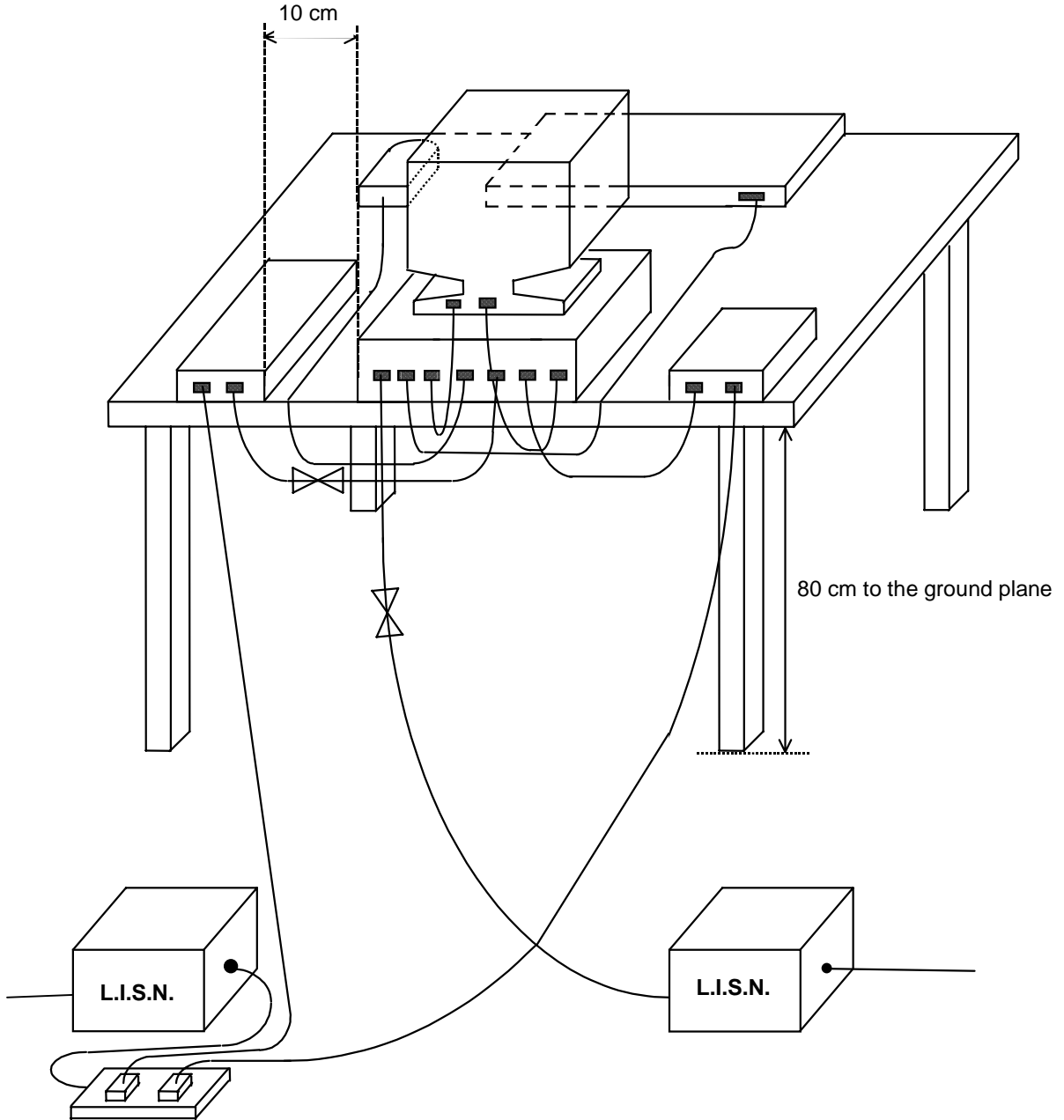
5.1. Major Measuring Instruments

Test Receiver	HP 85462A
Attenuation	0 dB
Start Frequency	0.15 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 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 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system 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 one 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

5.4.1. Test mode : POWER: PC

- Temperature : 26°C
- Relative Humidity : 60 %
- Test Date : May. 19, 1999

The Conducted Emission test was passed at minimum margin

LINE 12.003 MHz / 49.70 dBuV.

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.404	L	42.40	42.00	131.83	125.89	57.78	47.78	774.46	244.91	-15.38	-5.78
10.113	L	43.90	28.50	156.68	26.61	60.00	50.00	1000.00	316.23	-16.10	-21.50
12.003	L	49.70	37.30	305.49	73.28	60.00	50.00	1000.00	316.23	-10.30	-12.70
0.402	N	41.80	41.40	123.03	117.49	57.80	47.80	776.41	245.52	-16.00	-6.40
8.680	N	43.70	26.80	153.11	21.88	60.00	50.00	1000.00	316.23	-16.30	-23.20
12.000	N	48.30	31.00	260.02	35.48	60.00	50.00	1000.00	316.23	-11.70	-19.00

Test Engineer : _____
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5.4.2. Test mode : ADAPTER

- Temperature : 26°C
- Relative Humidity : 60 %
- Test Date : May. 19, 1999

The Conducted Emission test was passed at minimum margin

LINE 0.234 MHz / 45.20 dBuV.

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.152	L	43.80	22.30	154.88	13.03	65.90	55.90	1972.63	623.80	-22.10	-33.60
0.234	L	45.20	41.90	181.97	124.45	62.31	52.31	1304.14	412.41	-17.11	-10.41
0.466	L	36.00	32.60	63.10	42.66	56.59	46.59	674.92	213.43	-20.59	-13.99
0.152	N	43.80	22.40	154.88	13.18	65.90	55.90	1972.63	623.80	-22.10	-33.50
0.235	N	44.20	40.90	162.18	110.92	62.29	52.29	1301.49	411.57	-18.09	-11.39
0.466	N	34.90	33.10	55.59	45.19	56.59	46.59	674.94	213.43	-21.69	-13.49

Test Engineer : _____
 PETER WANG

5.5. Photographs of Counducted Powerline Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW



SIDE VIEW



6. Test of Radiated Emission

Radiated emissions from 30 MHz to 1,000 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 section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

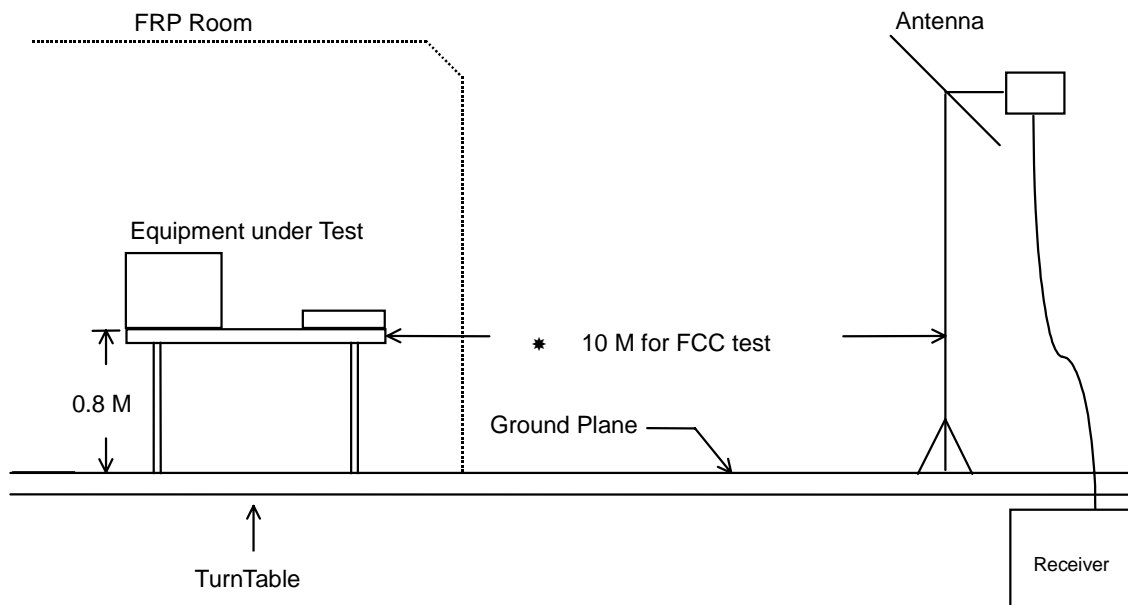
6.1. Major Measuring Instruments

Amplifier	(HP 87405A)
Attenuation	0 dB
RF Gain	25 dB
Signal Input	10 MHz to 3 GHz
Spectrum Analyzer	(HP 8560E)
Attenuation	0 dB
Start Frequency	30 MHz
Stop Frequency	1,000 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	30 Hz to 2.9 GHz
Test Receiver	(R&S ESCS30)
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 10 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 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

6.4.1. Test mode : POWER: PC

- Test Distance : 10 M
- Temperature : 25°C
- Relative Humidity : 61 %
- Test Date : May. 19, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

The Radiated Emission test was passed at minimum margin

48.002 MHz / 26.91 dBuV (VERTICAL) Antenna Height 1 Meter, Turntable Degree 189 °.

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
48.020	H	8.87	1.47	15.82	30.00	31.62	26.16	20.32	-3.84
72.160	H	6.36	1.72	17.95	30.00	31.62	26.03	20.02	-3.97
96.007	H	10.26	2.10	14.02	30.00	31.62	26.38	20.84	-3.62
216.000	H	10.10	3.13	13.50	30.00	31.62	26.73	21.70	-3.27
228.013	H	11.00	3.15	11.66	30.00	31.62	25.81	19.52	-4.19
48.002	V	8.87	1.47	16.57	30.00	31.62	26.91	22.16	-3.09

Test Engineer : _____
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6.4.2. Test mode : ADAPTER

- Test Distance : 10 M
- Temperature : 25°C
- Relative Humidity : 61 %
- Test Date : May. 19, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

The Radiated Emission test was passed at minimum margin

228.002 MHz / 26.86 dBuV (HORIZONTAL) Antenna Height 4 Meter, Turntable Degree 89 °.

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
133.870	H	12.30	2.45	10.46	30.00	31.62	25.21	18.22	-4.79
216.002	H	10.10	3.13	12.43	30.00	31.62	25.66	19.19	-4.34
228.002	H	11.00	3.15	12.71	30.00	31.62	26.86	22.03	-3.14
36.006	V	15.28	1.41	10.16	30.00	31.62	26.85	22.00	-3.15
114.660	V	12.11	2.45	12.12	30.00	31.62	26.68	21.58	-3.32
120.440	V	12.60	2.59	11.27	30.00	31.62	26.46	21.04	-3.54

Test Engineer : _____

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6.5. Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW



7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	14.7	1.4
35	15.9	1.4
40	12.8	1.4
45	10.5	1.5
50	7.8	1.5
55	6.7	1.5
60	5.5	1.6
65	5.8	1.6
70	6.2	1.7
75	6.6	1.8
80	7.0	1.8
85	8.3	1.9
90	9.6	2.0
95	10.1	2.1
100	10.7	2.2
110	11.8	2.4
120	12.6	2.6
130	12.7	2.4
140	11.7	2.5
150	11.0	2.6
160	10.3	2.6
170	10.2	2.8
180	9.4	3.1
190	9.1	3.0
200	8.8	3.1
220	10.4	3.1
240	11.9	3.2
260	13.0	3.4
280	13.7	3.5
300	14.4	3.8
320	14.6	3.8
340	14.7	3.9
360	15.2	4.1
380	15.9	4.2
400	16.6	4.3
450	17.5	4.5
500	17.8	4.9
550	19.8	5.0
600	20.0	5.2
650	20.2	5.5
700	20.1	5.9
750	20.7	6.0
800	20.7	6.2
850	20.5	6.4
900	21.7	6.6
950	20.4	6.9
1000	22.1	6.9

8. List of Measuring Equipment Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver (site 1)	HP	8591EM	3536A00673	9 KHz – 1.8 GHz	Aug. 27, 1998	Conduction
LISN (site 1)	EMCO	3850/2	9510-1035	50 ohm / 50 uH	Oct. 23, 1998	Conduction
LISN (site 1)	KYORITSU	KNW-47	8-693-10	50 ohm / 50 uH	Oct. 23, 1998	Conduction
EMI Filter (site 1)	CORCOM	MRI-2030	N/A	480 VAC / 30 A	N/A	Conduction
Amplifier (Site 1)	HP	87405A	3207A01437	10MHz –3.0GHz	Jun. 26, 1998	Radiation
Spectrum Analyzer (site 1)	HP	8560E	3728A03186	30Hz – 2.9GHz	Sep. 18, 1998	Radiation
Receiver (Site 1)	R&S	ESCS30	70-213-4258	9KHz - 2.75GHz	Dec. 18, 1998	Radiation
Bilog Antenna (Site 1)	CHASE	CBL6112B	2445	30MHz -2GHz	Apr. 01, 1999	Radiation
Half-wave dipole antenna (site 1)	EMCO	3121C	9705-1285	28 M - 1GHz	May 19, 1999	Radiation
Turn Table (site 1)	EMCO	1060-1.211	9507-1805	0 – 360 degree	N/A	Radiation
Antenna Mast (site 1)	EMCO	2075	9806-2160	1 m - 4 m	N/A	Radiation