

SYSGRATION LTD.
FCC ID.: HQXPC98617-01
EUT : Uninterruptable Power Supply

Exhibit C Measurement Report



EMI TEST REPORT

FCC ID. : HQXPC98617-01
Product : Uninterruptable Power Supply
Model No. : PRO 1400
Applicant : SYSGRATION LTD.
Manufacturer : SYSGRATION LTD.
Regulation Applied : FCC Rules and Regulations Part 15 Subpart B
(1997)
Report Number : ET88S-06-096
Issued Date : Jul. 20, 1999

The compliance test is only certified for the test equipment and the results of the testing report relate only to the item tested. The compliance test of this report was conducted in accordance with the appropriate standards. It's not intention to assure the quality and performance of the product. This report shall not be reproduced except in full, without the approval of ETC. This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

BSMI ISO 9002 and Guide 25.

TÜV Product Service ISO9002 and EN45001.

NIST NVLAP Accredited Laboratory for FCC Part 15/ CISPR 22/ AS/NZS 3548.

CNLA ISO/ IEC Guide 25.

NEMKO, FIMKO , SGS , TÜV Laboratory Assessment EN45001.

FCC, VCCI Registered.



TEST REPORT CERTIFICATE

Applicant : SYSGRATION LTD.
8Fl., No. 542-7, Chung Cheng Rd., Hsin Tien, Taipei,
Taiwan, R.O.C.

Manufacturer : SYSGRATION LTD.
No. 26, Industrial N. Road Nan-Kang Industrial Park, Nan-Tou City,
Taiwan, R.O.C.

Description of EUT :
a) Type of EUT : Uninterruptable Power Supply
b) Model No./Type No. : PRO 1400
c) Power Source : 115V, 60Hz, 910W

Comment Issues : a) The data also apply to PRO 1000
b) The different models which has different output capacity as following:
PRO 1400:1400VA/with AVR
PRO 1000:1000VA/with AVR

Regulation Applied : FCC Rules and Regulations Part 15 Subpart B (1997)

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was found to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Test Date : Jul. 12, 1999

Test Engineer : Bu-cheng Lin

Approve & Authorized Signer : Win-Po Tsai Jul. 20, 1999

Win-Po Tsai, Supervisor, NVLAP Signatory

EMC Dept. of ELECTRONICS

TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

The UPS is a extremely reliable standby uninterrupted power system designed to keep computers and peripheral devices such as monitors, storage subsystems, modems, tape drives, etc., performing from utility line failures which could result in damage of data. In the event of utility failure, the UPS supplies power to your equipment driven from a battery within the UPS and provides visual and audible indicators which alert you to utility line failures therefore the user has ample time to save file and close operations.

1.2 Test Methodology

Both conducted and radiated emissions were performed according to the procedures in ANSI C63.4.

1.3 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.

This site has been accreditation as a FCC filing site.

2. PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:

A device that intentionally generates radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class B Digital Device :

A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business or industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

For unintentional device, according to **FCC § 15.107(a)** Line Conducted Emission Limits class B is as following:

Frequency MHz	Emissions μV	Emissions dB μV
0.45 - 30.0	250	48.0

For unintentional device, according to **CISPR 22** Line Conducted Emission Limits class B is as following:

Frequency MHz	Quasi Peak dB μV	Average dB μV
0.15 - 0.5	66-56	56-46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

For unintentional device, according to **AS/NZS 3548** Line Conducted Emission Limits class B is as following:

Frequency MHz	Quasi Peak dB μ V	Average dB μ V
0.15 - 0.5	66-56	56-46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

(2) Radiated Emission Requirement

For unintentional device, according to **FCC § 15.109(a)**, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated μ V/m	Radiated dB μ V/m
30 - 88	3	100	40.0
88 - 216	3	150	43.5
216 - 960	3	200	46.0
above 960	3	500	54.0

For unintentional device, according to **CISPR 22** Radiated Emission Limits class B is as following:

Frequency MHz	Distance Meters	Radiated dB μ V/m
30 to 230	10	30
230 to 1000	10	37

For unintentional device, according to **AS/ NZS 3548** Radiated Emission Limits class B is as following:

Frequency MHz	Distance Meters	Radiated dB μ V/m
30 to 230	10	30
230 to 1000	10	37

2.3 Labelling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.4 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

3. SYSTEM TEST CONFIGURATION

3.1 EUT configuration and operating

The system was configured for testing in a typical fashion, as a customer would normally use it. Measurement was performed under the condition that the EUT was connected with peripherals. During the test, the PC run the program "Management software of sysgration's UPS".

3.2 Devices for Tested System

Description	Model	Manufacturer	Cable
Uninterruptable Power Supply *1	PRO 1400	SYSGRATION LTD.	AC Power Cord (Unshielded)
Monitor	P750	NEC	1.8m Shielded Cable 1.8m Unshielded AC Power Cord
PC	VE 5/200	Hewlett-Packard	1.8m Shielded Cable 1.8m Unshielded AC Power Cord
Keyboard	E03633YLTW3-C	Hewlett-Packard	1.8m Unshielded Cable
Mouse	M-S34	IBM	1.8m Unshielded Cable
Incondescent Lamps	----	----	----

“*” -- Equipment Under Test

3.3 Modification Record

(If any deviation from additions to or exclusions from test method must be stated)

N/A

4. RADIATED EMISSION MEASUREMENT

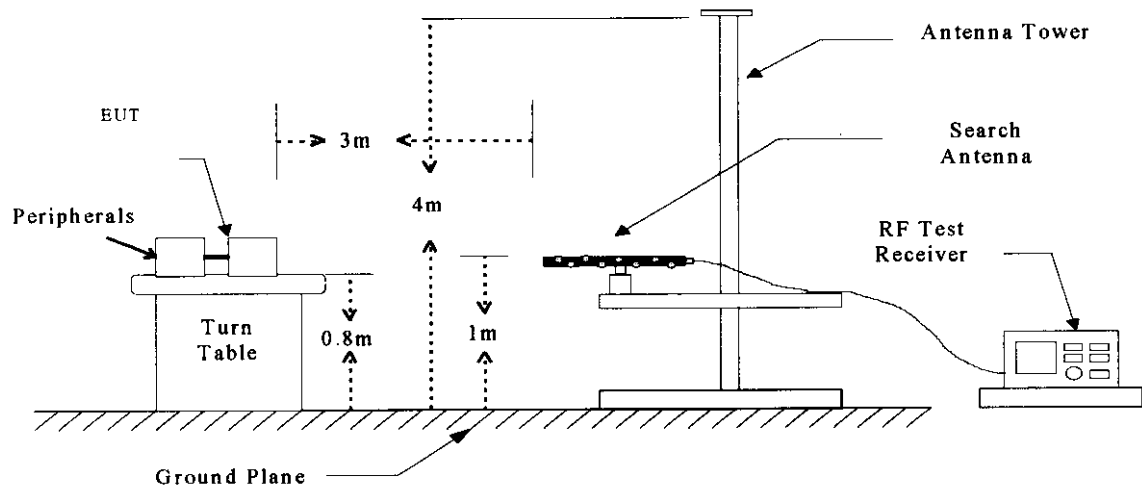
4.1 Applicable Standard

For unintentional radiator digital devices, the radiated emission shall comply with § 15.109(a). And according to § 15.109 (g), as an alternative to the radiated emission limits is CISPR 22.

4.2 Measurement Procedure

1. Setup the configuration per figure 1.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions then each selected frequency in precisely measured.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that the highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Check the frequency of the highest emission with varying the placement of cables associated with EUT to obtain the worst case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration



4.3 Radiated Emission Data

Below 1GHz

A.

Model No./Type No. : PRO 1400Operation Mode : Line ModeEUT Power : AC 110V/60HzTest Date : Jul. 12, 1999Temperature : 28 °CHumidity : 70%

Emission Frequency (MHz)	Meter Reading (dB μ V)		Corr'd Factor (dB)	Results (dB μ V/m)		AH (m)		DRT degree		Limit @3m (dB μ V/m)	Margin (dB)
	Hor.	Ver.		Hor.	Ver.	Hor.	Ver.	Hor.	Ver.		
39.286	***	21.8	11.1	***	32.9	***	1.0	***	5	40.0	-7.2
40.249	19.0	***	11.1	30.1	***	1.2	***	12	***	40.0	-9.9
46.413	***	22.2	9.5	***	31.7	***	1.0	***	37	40.0	-8.3
51.325	21.3	***	8.0	29.3	***	1.0	***	46	***	40.0	-10.7
52.772	***	22.5	7.8	***	30.3	***	1.0	***	48	40.0	-9.7
60.835	***	20.8	7.5	***	28.3	***	1.0	***	14	40.0	-11.7
98.096	18.6	***	9.4	28.0	***	1.0	***	0	***	43.5	-15.5
103.192	***	26.1	9.4	***	35.5	***	1.0	***	0	43.5	-8.0
117.681	***	23.2	9.4	***	32.6	***	1.1	***	19	43.5	-10.9
117.765	19.0	***	9.4	28.4	***	1.5	***	0	***	43.5	-15.1
125.605	12.8	***	10.6	23.4	***	1.2	***	120	***	43.5	-20.1
179.287	15.3	***	11.8	27.1	***	1.4	***	5	***	43.5	-16.4

Note:

1. AH means antenna height, DRT means degrees of rotation of turntable.
2. The symbol of "****" means the value is too low to be detected.

B.

Model No./Type No. : PRO 1400Operation Mode : Battery ModeEUT Power : AC 110V/60HzTest Date : Jul. 12, 1999Temperature : 28 °CHumidity : 70%

Emission Frequency (MHz)	Meter Reading (dB μ V)		Corr'd Factor (dB)	Results (dB μ V/m)		AH (m)		DRT degree		Limit @3m (dB μ V/m)	Margin (dB)
	Hor.	Ver.		Hor.	Ver.	Hor.	Ver.	Hor.	Ver.		
40.102	***	24.1	11.1	***	35.2	***	1.0	***	0	40.0	-4.8
40.257	21.5	***	11.1	32.6	***	1.2	***	12	***	40.0	-7.4
48.525	***	25.3	8.0	***	33.3	***	1.0	***	32	40.0	-6.8
51.733	***	22.3	8.0	***	30.3	***	1.1	***	55	40.0	-9.7
52.106	22.2	***	8.0	30.2	***	1.1	***	48	***	40.0	-9.8
98.114	18.7	***	9.4	28.1	***	1.0	***	5	***	43.5	-15.4
103.187	***	22.4	9.4	***	31.8	***	1.0	***	0	43.5	-11.8
117.779	19.7	***	9.4	29.1	***	1.5	***	0	***	43.5	-14.4
117.886	***	22.7	9.4	***	32.1	***	1.0	***	12	43.5	-11.4
125.989	14.0	***	10.6	24.6	***	1.2	***	130	***	43.5	-18.9
126.002	***	15.5	10.6	***	26.1	***	1.1	***	0	43.5	-17.4
179.331	15.2	***	11.8	27.0	***	1.5	***	3	***	43.5	-16.5

Note:

1. AH means antenna height, DRT means degrees of rotation of turntable.
2. The symbol of "****" means the value is too low to be detected.

4.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

$$\textbf{Result} = \textbf{Reading} + \textbf{Corrected Factor}$$

where

$$\text{Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

4.5 Radiated Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Test Receiver	Hewlett-Packard	8546A	3411A00192	Nov. 04, 1999
BiconiLog Antenna	EMCO	3142	9702-1142	Aug. 20, 1999

Note: The standards used to perform this calibration are traceable to NML/ROC and NIST/USA.

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A

5. CONDUCTED EMISSION MEASUREMENT

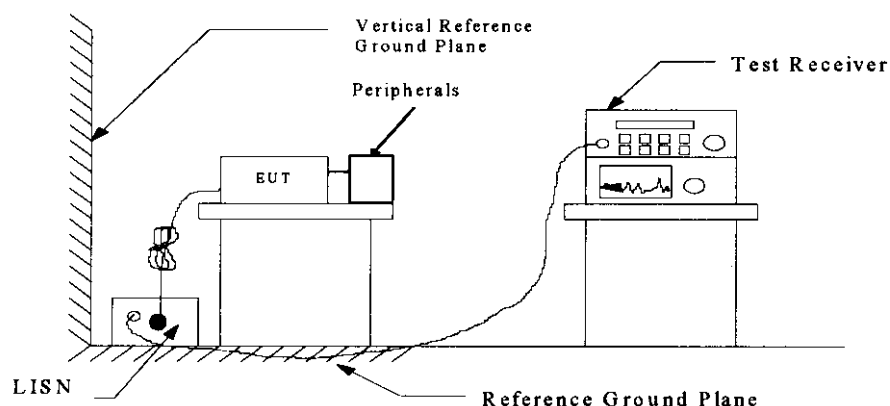
5.1 Applicable Standard

For unintentional digital devices, Line Conducted Emission Limits are in accordance to § 15.107(a). And according to § 15.107(e), an alternative to the conducted limits is CISPR 22.

5.2 Measurement Procedure

1. Setup the configuration per figure 2.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 4 to 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 2 : Conducted emissions measurement configuration



5.3 Conducted Emission Data

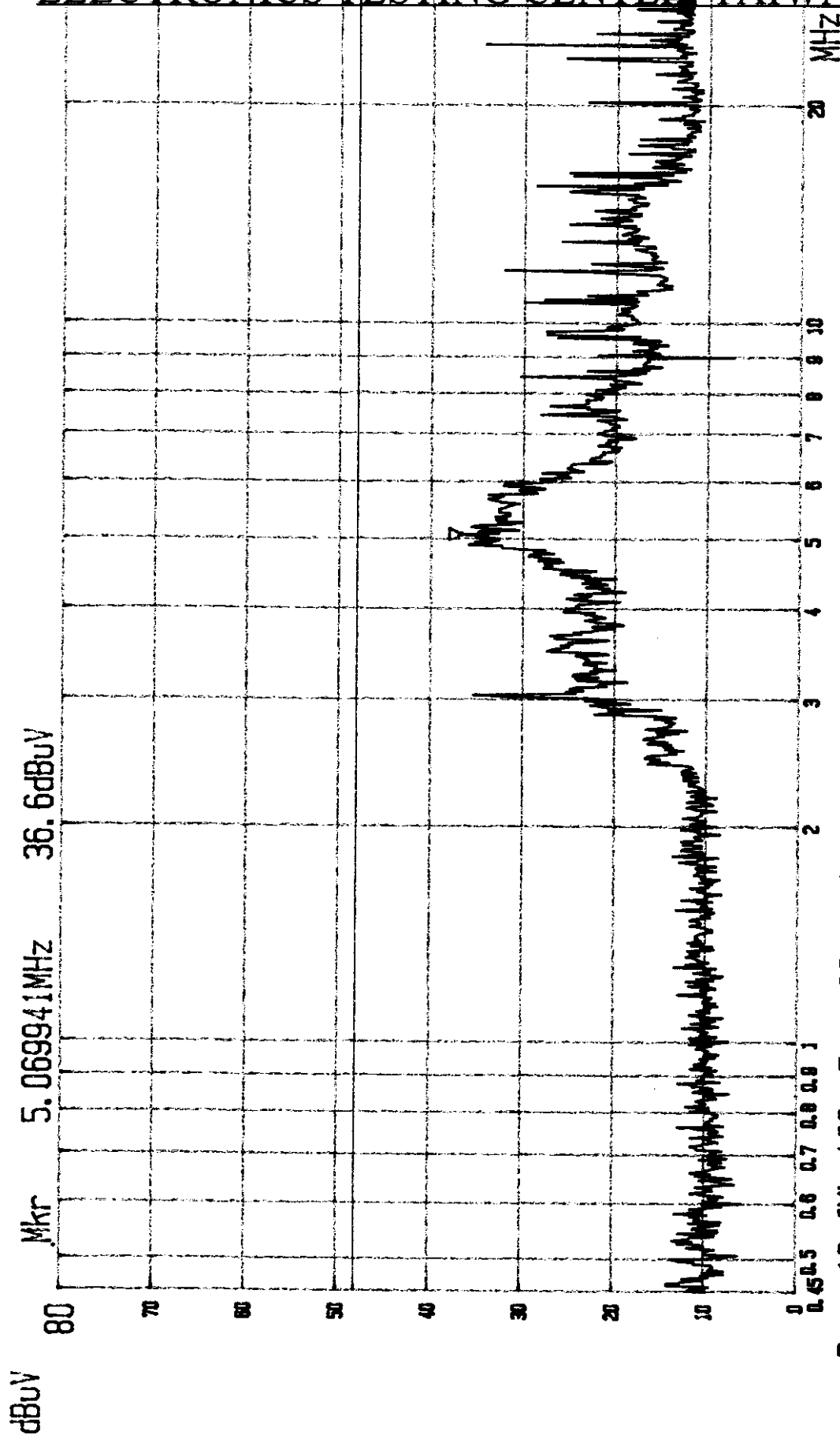
A.

Model No./Type No. : PRO 1400Operation Mode : Line ModeEUT Power : AC 110V/60HzTest Date : Jul. 12, 1999Temperature : 28 °CHumidity : 70%

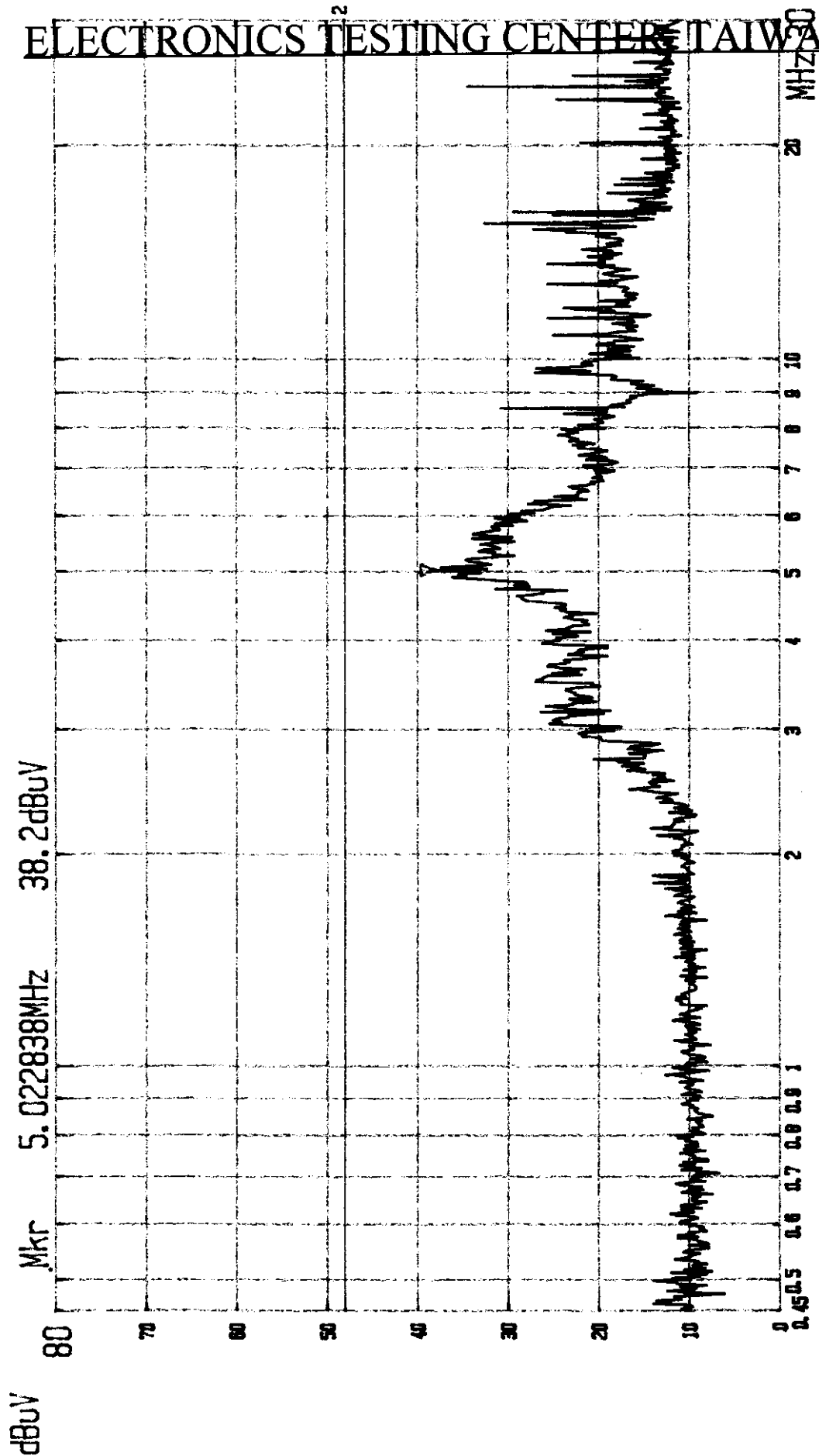
Emission Frequency (MHz)	Meter Reading (dBuV)		CORR'd Factor (dB)	Results (dBuV)		Limit (dBuV)	Margins (dB)
	L1	L2		L1	L2		
2.964	26.2	***	0.2	26.4	***	48.0	-21.6
3.006	***	30.8	0.2	***	31.0	48.0	-17.0
4.907	***	37.4	0.2	***	37.6	48.0	-10.4
5.069	35.6	***	0.2	35.8	***	48.0	-12.2
5.886	***	32.2	0.2	***	32.4	48.0	-15.6
5.913	32.2	***	0.2	32.4	***	48.0	-15.6
7.608	***	30.6	0.3	***	30.9	48.0	-17.1
9.213	26.8	***	0.3	27.1	***	48.0	-20.9
10.498	***	28.4	0.4	***	28.8	48.0	-19.2
11.051	28.4	***	0.4	28.8	***	48.0	-19.2
13.507	26.4	***	0.4	26.8	***	48.0	-21.2
16.128	***	28.6	0.4	***	29.0	48.0	-19.0
24.204	34.0	34.4	0.5	34.5	34.9	48.0	-13.1

Note :

1. "****" means the noise is too low to be measured.
2. The full frequency range scanning test data is shown in next two pages.



!---- Date 12 JUL '99 Time 20:19:02
FCC PART15 PRO1400 L1 AC110V/60HZ



----- Date 12 JUL '99 Time 20:26:10
FCC PART15 PRO1400 L2 AC110V/60HZ

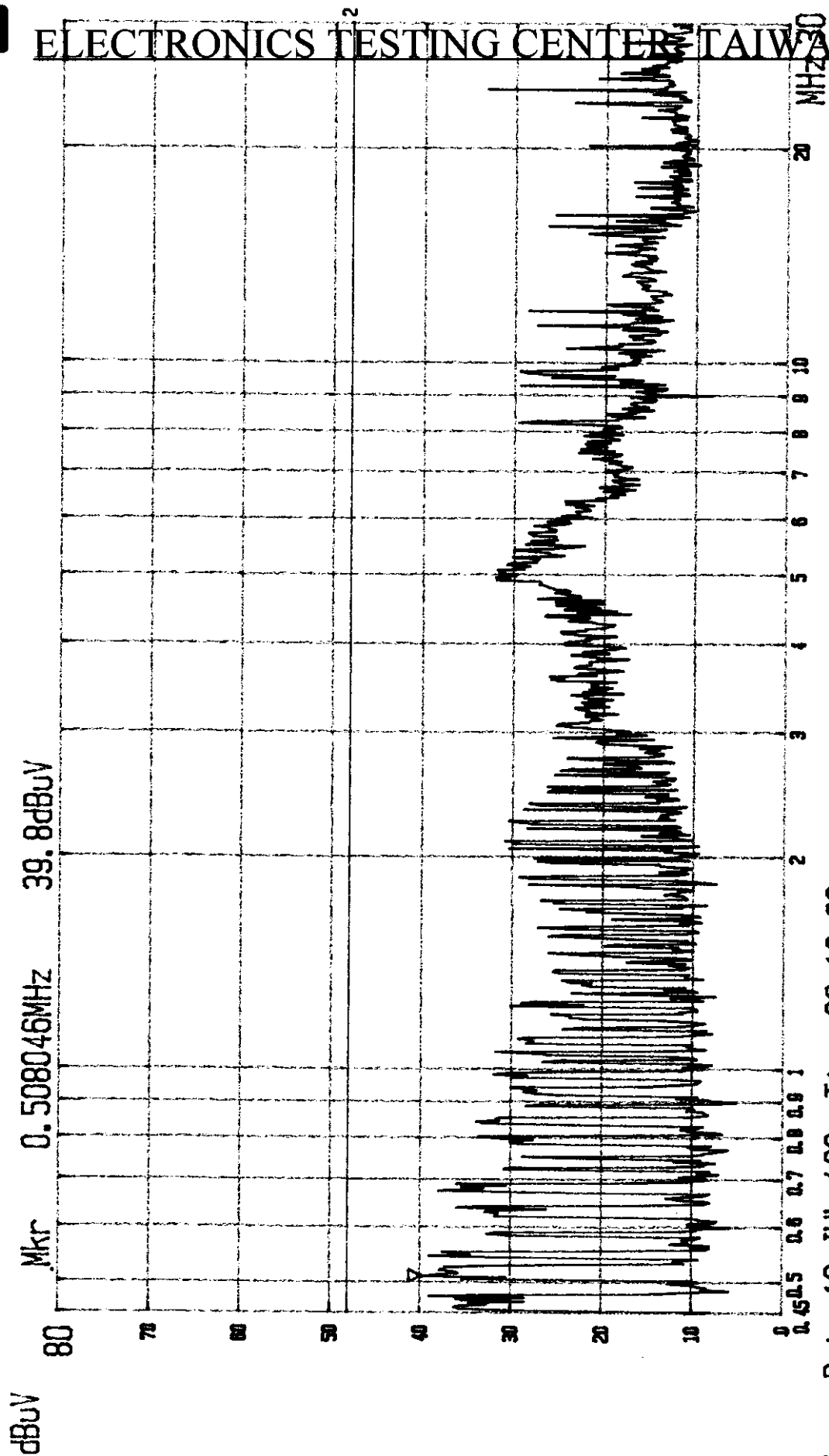
B.

Model No./Type No. : PRO 1400Operation Mode : Battery ModeEUT Power : AC 110V/60HzTest Date : Jul. 12, 1999Temperature : 28 °CHumidity : 70%

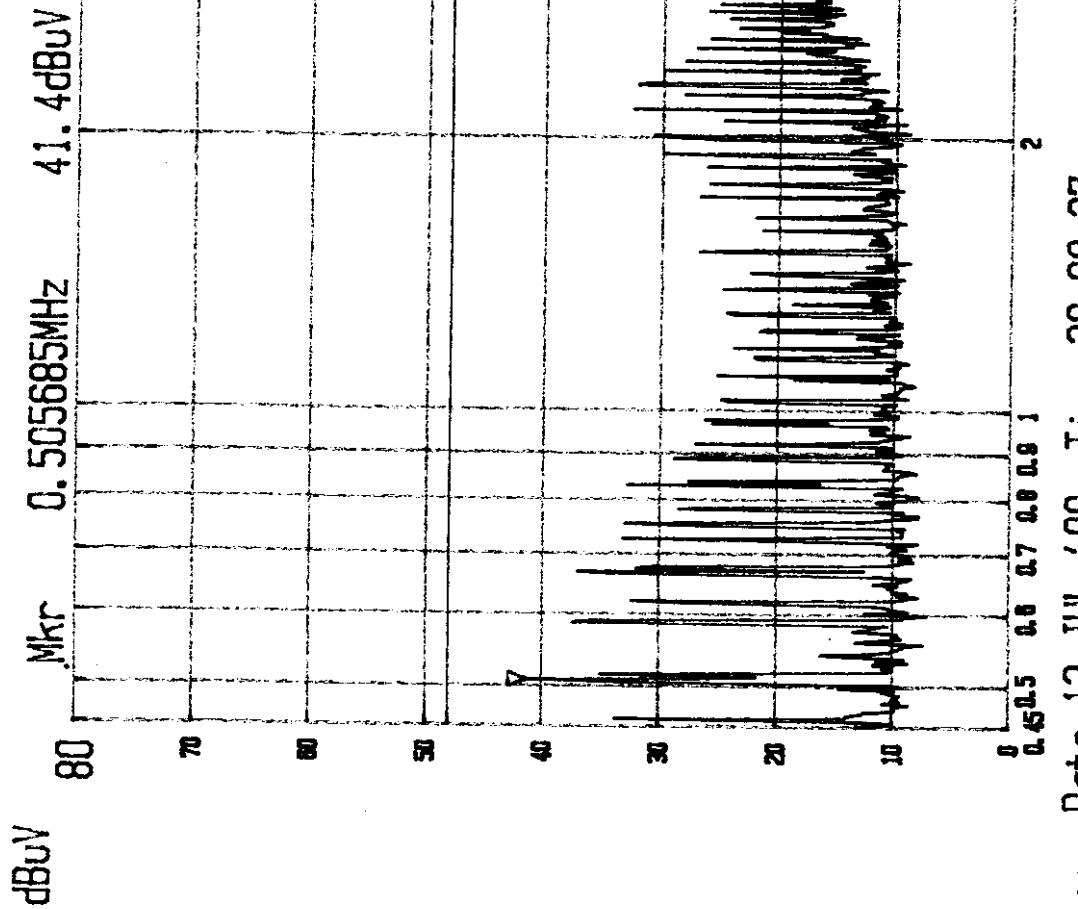
Emission Frequency (MHz)	Meter Reading (dBuV)		CORR'd Factor (dB)	Results (dBuV)		Limit (dBuV)	Margins (dB)
	L1	L2		L1	L2		
0.505	***	41.4	0.1	***	41.5	48.0	-6.5
0.529	35.2	***	0.1	35.3	***	48.0	-12.7
0.600	39.8	***	0.1	39.9	***	48.0	-8.1
0.665	***	37.0	0.1	***	37.1	48.0	-10.9
2.139	***	32.6	0.2	***	32.8	48.0	-15.2
2.149	31.4	***	0.2	31.6	***	48.0	-16.4
4.907	32.6	***	0.2	32.8	***	48.0	-15.2
5.069	***	34.6	0.2	***	34.8	48.0	-3.2
8.593	33.0	***	0.3	33.3	***	48.0	-14.7
10.304	***	33.2	0.4	***	33.6	48.0	-14.4
12.535	***	34.2	0.4	***	34.6	48.0	-13.4
16.128	25.6	***	0.4	26.0	***	48.0	-22.0
24.204	33.2	33.4	0.5	33.7	33.9	48.0	-14.1

Note :

1. "****" means the noise is too low to be measured.
2. The full frequency range scanning test data is shown in next two pages.



! --- Date 12 JUL '99 Time 20:12:38
FCC PART15 PRO1400 L1 AC110V/60HZ



---- Date 12 JUL '99 Time 20:09:27
FCC PART15 PRO1400 L2 AC110V/60HZ

5.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{LISN FACTOR}$$

Assume a receiver reading of 22.5 dB μ V is obtained, and LISN Factor is 0.1 dB, then the total of field strength is 22.6 dB μ V.

$$\text{RESULT} = 22.5 + 0.1 = 22.6 \text{ dB } \mu \text{ V}$$

$$\begin{aligned} \text{Level in } \mu \text{ V} &= \text{Common Antilogarithm}[(22.6 \text{ dB } \mu \text{ V})/20] \\ &= 13.48 \mu \text{ V} \end{aligned}$$

5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Test Receiver	Rohde and Schwarz	ESH3	894718/018	Jan. 20, 2000
Line Impedance Stabilization network	EMCO	3825/2	9704-2677	Oct. 29, 1999
Line Impedance Stabilization network	EMCO	3825/2	9704-2678	Oct. 29, 1999
Plotter	Hewlett-Packard	7470A	----	N/A

Note: The standards used to perform this calibration are traceable to NML/ROC and NIST/USA.