IST EMC LAB.

E M I S S I O N T E S T R E P O R T

Test report file No. : **04-IST-0017/FB** Date of issue : Feb. 3, 2004

Model / Type No. : L710M ■ Basic □ Alternate

Kind of product : 17" LCD Monitor

Brand name : DAEWOO Lucoms

Applicant : DAEWOO Lucoms co., ltd.

Manufacturer : DAEWOO Lucoms co., ltd.

License holder : DAEWOO Lucoms co., ltd.

Address : Gaya-Venture B/D, 28-130, Yeongdeungpo-Dong, Yeondeungpo-Gu, Seoul, Korea

Test result according to the regulation(s)

■ Positive □ Negative

at page 3.

This test report with appendix consists of 23 pages. The test result only responds to the tested sample.
It is not allowed to copy this report even partly without the allowance of the Test Laboratory.
This equipment is complied with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4:2001.

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DIRECTORY

A) Documentation.

B) Test Data.

C) Appendix

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TEST REGULATIONS

The tests were performed according to the following regulations ;

■ - FCC Part 15, Subpart B (Unintentional Radiators, Class B)

Information of Test Laboratory

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EQUIPMENT UNDER TEST

Equipment Description :

Pannel :	Size : 17-inch(43.2cm) diagonal Pixel Pitch : 0.264 x 0.264 mm
Max Resolution :	1280 x 1024, 75Hz
Colors :	16M colors
PC Input Signal :	Sync : H/V separate(TTL) Video : 15 pin mini D-sub(Analog RGB)
Dimensions(W x H x D) :	386mm(W) x 398mm(H) x 190mm(D) (with stand) 386mm(W) x 346mm(H) x 190mm(D) (without stand)
Power Source :	100-240Vac, 50/60Hz(Free Voltage)
Power Consumption :	35W
Operating Temperature :	10 ~ 40℃/50~104˚F

EUT Type :

☒ Table-Top.
☐ Floor-Standing.
☐ Table-Top and Floor-Standing(Combination).

Operation – mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

☐ Standby.
☒ Operational Condition : Scrolling "H" characters under MS Windows, at test mode of 1280 X 1024, 75 Hz

Configuration of the equipment under test :

Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.
PC	Brio BA600/550	HP	SG01901711
Keyboard	SK-2502C	HP	M0004102892
PS/2 Mouse	M-S48A	HP	LZE01251424
Serial Mouse	M-M28	Logitech	LCA53305547
Printer	A0302384	Northern Telecom	26633S60168

Connecting Interface Cables :
- Unshielded AC power cable : 1.8 m
- Shielded monitor's signal cable(with two ferrite core) : 1.5 m
- Shielded printer's signal cable (with two ferrite core): 1.5 m
- Unshielded Sound cable(with one ferrite core) : 1.5 m

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TEST CONDITIONS

The **measurement of the conducted emissions (Interference voltage)** was performed in a shielded room.

Test location :

☒ Shielded room. No.1 ☐ Compact chamber 2

Used testing instruments :

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESH 3	Test Receiver	Rohde & Schwarz	Jul. 22, 2003	892108/018
KNW-407	LISN	Hyup-Rip	Jul. 23, 2003	8-883-10
ESH 3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 23, 2003	357.8810.52

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement Procedures :

Conducted emissions measurments were made in accordance with ANSI C63.4:2001, "Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to an EMI/Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within an IF bandwidth of 10kHz or for "quasi-peak" within a bandwidth of 9kHz.

All used test-instruments as well as the test-accessories are calibrated regularly.

Test Engineer :

S.J.Oh / Research Engineer
IST EMC Lab.

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The **measurement of the radiated emissions (Electric field)** in the frequency range from 30 MHz to 1GHz was performed in horizontal and vertical antenna polarization at a open-site which meet the site attenuation requirement of ANSI C63.4:2001 and a test distance of :

Location :	☒ Open Site No. 1	☐ Open Site No. 2	☐ Open Site No. 3
Distance :	☒ 3 meters	☐ 10 meters	

Used testing instruments :

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESVP	Test Receiver	Rohde & Schwarz	Jul. 22, 2003	861744/004
VULB 9160	Antenna	Schwarzbeck	Jul. 09, 2003	3048

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement procedures

Radiated measurements were in accordance with ANSI C63.4:2001 “Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The measurements were performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a EMI/Field Intensity Meter. The measurements were made with the detector set for “quasi-peak” within a bandwidth of 120kHz.

All used test-instruments as well as the test-accessories are calibrated regularly.

Test Engineer :

S.J.Oh / Research Engineer
IST EMC Lab.

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TEST RESULT

Conducted emissions : 150 kHz - 30 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

5.1 dB at 2.761 MHz

Remarks : See test-data at pages 13 ~ 15.
(with speaker)

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

3.1 dB at 120.3 MHz

Remarks : See test-data at page 19 ~ 20.
(with speaker)

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Conducted emissions : 150 kHz - 30 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

6.4 dB at 4.937 MHz

Remarks : See test-data at pages 16 ~ 18.
(without speaker)

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

3.1 dB at 133.5 MHz

Remarks : See test-data at page 21~22 .
(without speaker)

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Measurement Uncertainty Calculation

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

Contribution (Conducted Emissions)	Probability Distribution	Uncertainty (±dB) 0.15-30MHz
Receiver Specification	Rectangular	1.5
LISN Coupling Specification	Rectangular	1.5
Cable and Input Attenuator Calibration	Normal (k=2)	0.5
Mismatch to Reciver	U-Shaped	-0.8 / +0.7
System Repeatability	Normal (k=1)	0.2
Combined Standard Uncertainty	Normal (k=2)	-1.85 / +1.71
Expanded Uncertainty U	Normal (k=2)	-3.7 / +3.42

$U_{c,\min\ us}$ = -1.85, $U_{c,plus}$ = 1.71

U = -3.70 / +3.42 (k=2, 95.45% confidence level)

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties(±dB) 3 m
Antenna		
Factor	Normal (k=2)	0.9968
Frequency Interpolation	Rectangular	0.1039
Height Variation	Rectangular	-2.6 / +1.5
Directivity Difference	Rectangular	-1.0 / +0
Phase Center Location	Rectangular	1.0
Cable Loss	Normal (k=2)	0.5
Receiver		
Voltage Accuracy	Normal (k=2)	2.0
Pulse Response	Rectangular	1.5
Absolute Repetition Rate	Rectangular	1.5
Mismatch to Receiver $\lvert \Gamma_{antenna} \rvert = 0.33$ $\lvert \Gamma_{receiver} \rvert = 0.33$	U-Shaped	-1.0 / +0.9
System Repeatibility	Std Deviation	0.5
Combined Standard Uncertainty	Normal	-2.6048 / 2.2775
Expanded Uncertainty U	Normal (k=2)	-5.21 / +4.55

$U_{c,\min\ us}$ = -2.6048, $U_{c,plus}$ = 2.2775

U = -5.21 / +4.55 (k=2, 95.45% confidence level)

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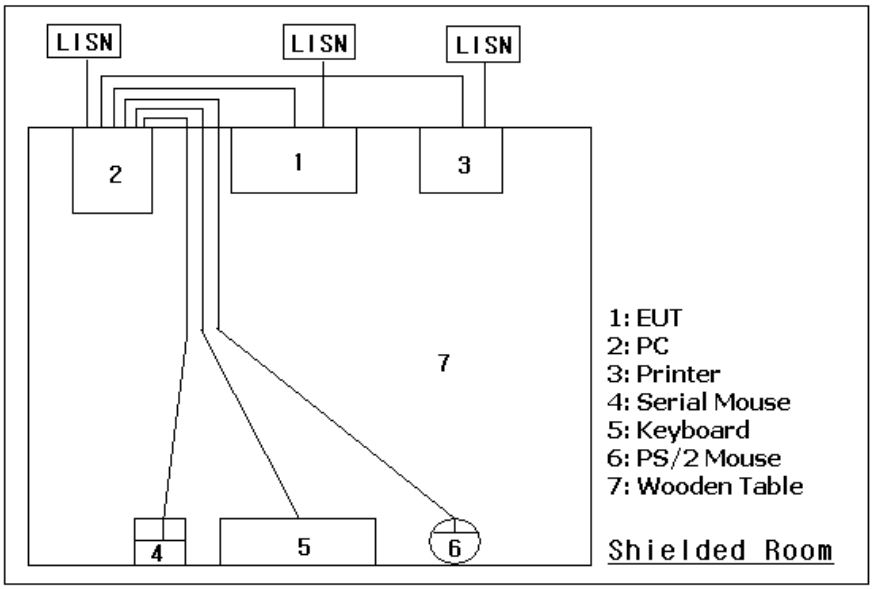
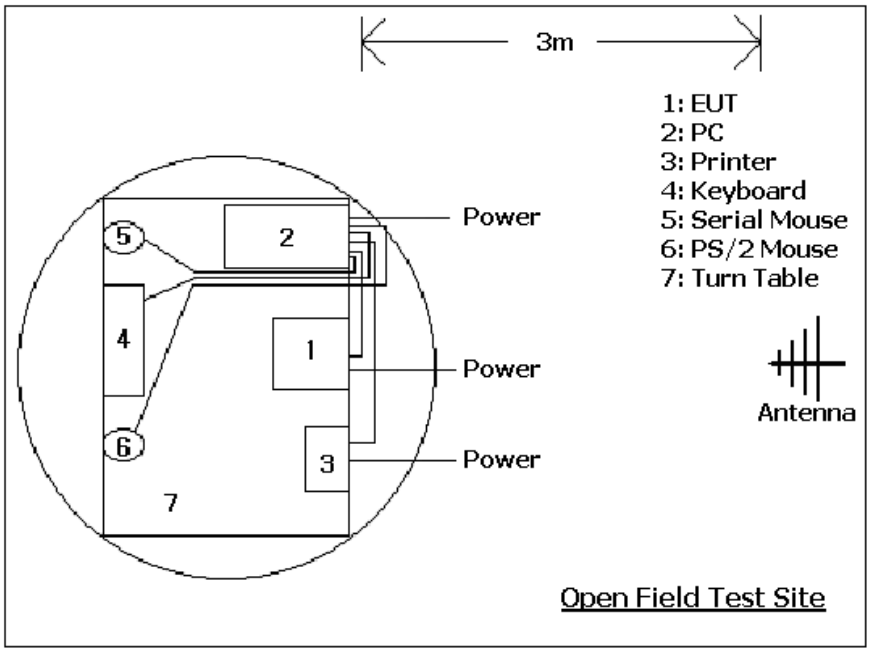
TEST SETUP (Drawings)

Type : L710M



Conducted Emissions 150kHz - 30 MHz



Radiated Emissions 30 MHz - 1000 MHz

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TEST SETUP (Photos)

Type : L710M

Conducted Emissions 150kHz - 30 MHz

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TEST SETUP (Photos)

Type : L710M

Radiated Emissions 30MHz - 1000 MHz

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Conducted Emission Test Data

Type	L710M (with speaker)	
Manufacturer	DAEWOO Lucoms Co., Ltd	
Operation mode	Scrolling "H" pattern display at 1280 x 1024, 75Hz	
Environmental Conditon	Temperature	: 18°C
	Humidity	: 37%
	Atmospheric pressure	: 1011mbar
Date	Jan. 26, 2004	

Highest Emissions ralative to the limit

Frequency [MHz]	Reading [dBμV]		Phase	Insertion Loss (LISN)	Limit [dBμV]		Margin [dB]	
	Q-peak	AV			Q-peak	AV	Q-peak	AV
0.212	42.8	39.3	L1	0.8	63.1	53.1	19.5	13.0
0.283	39.8	35.5		0.8	60.7	50.7	20.1	14.4
2.402	37.9	37.2		0.8	56.0	46.0	17.3	8.0
4.941	40.4	39.0		0.8	56.0	46.0	14.8	6.2
8.329	42.7	40.6		0.8	60.0	50.0	16.5	8.6
12.14	42.1	38.5		0.8	60.0	50.0	17.1	10.7
0.213	44.6	40.5	N	0.8	63.1	53.1	17.7	11.8
0.284	41.2	37.5		0.8	60.7	50.7	18.7	12.4
2.408	36.7	36.6		0.8	56.0	46.0	18.5	8.6
2.761	36.4	40.1		0.8	56.0	46.0	18.8	5.1
8.561	42.4	40.1		0.8	60.0	50.0	16.8	9.1
12.672	45.0	30.3		0.8	60.0	50.0	14.2	18.9
Cable loss are less than 0.1 dB								

*L1 : Live Line
**N : Neutral Line
*** **Please refer to data graphs at page 14 ~ 15.**

Coverage factor of k=2 will ensure that the level of confidence will be approximately 95.45%,
Uncertainty U = -3.70 / +3.42 [dB]

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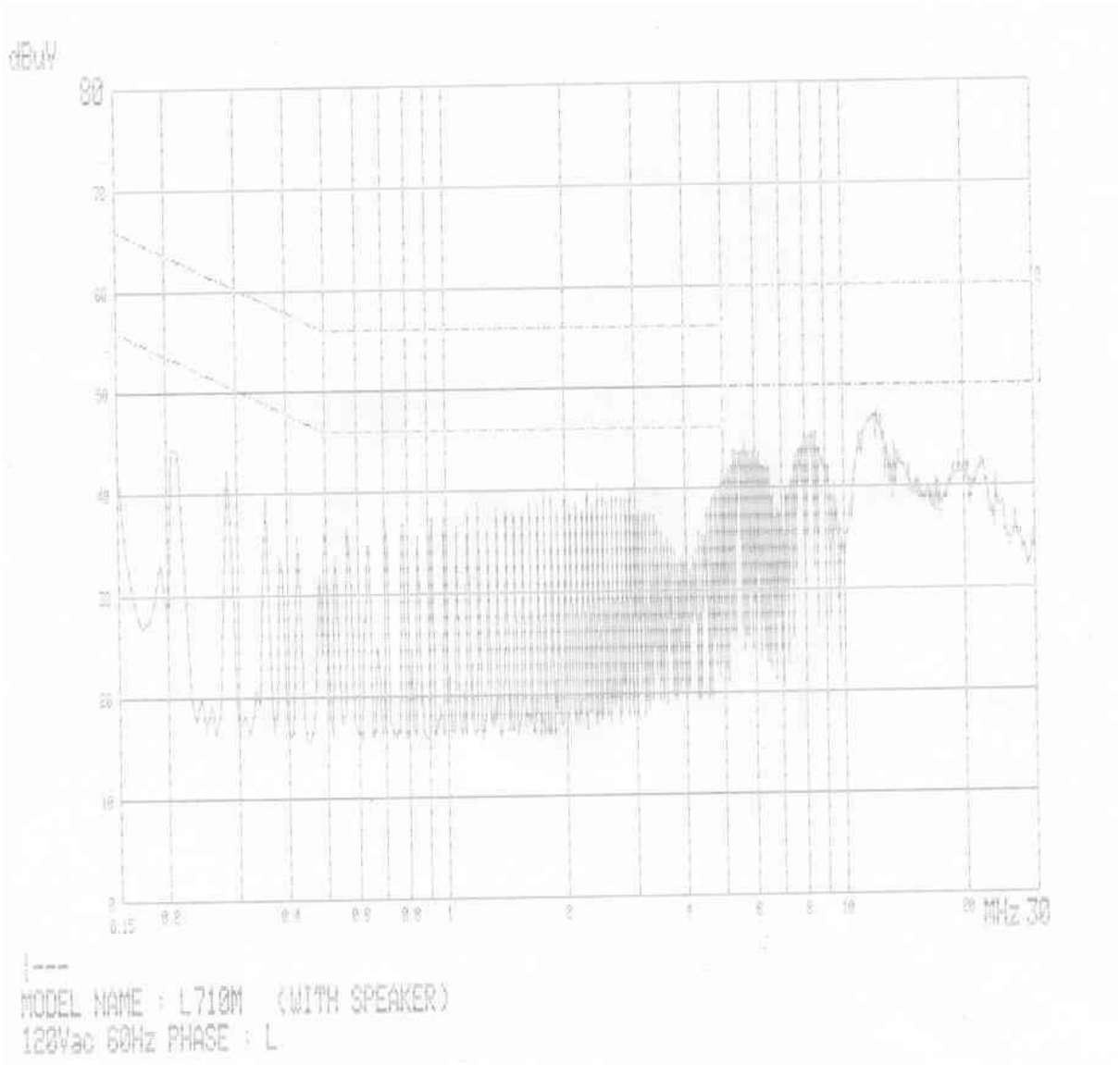

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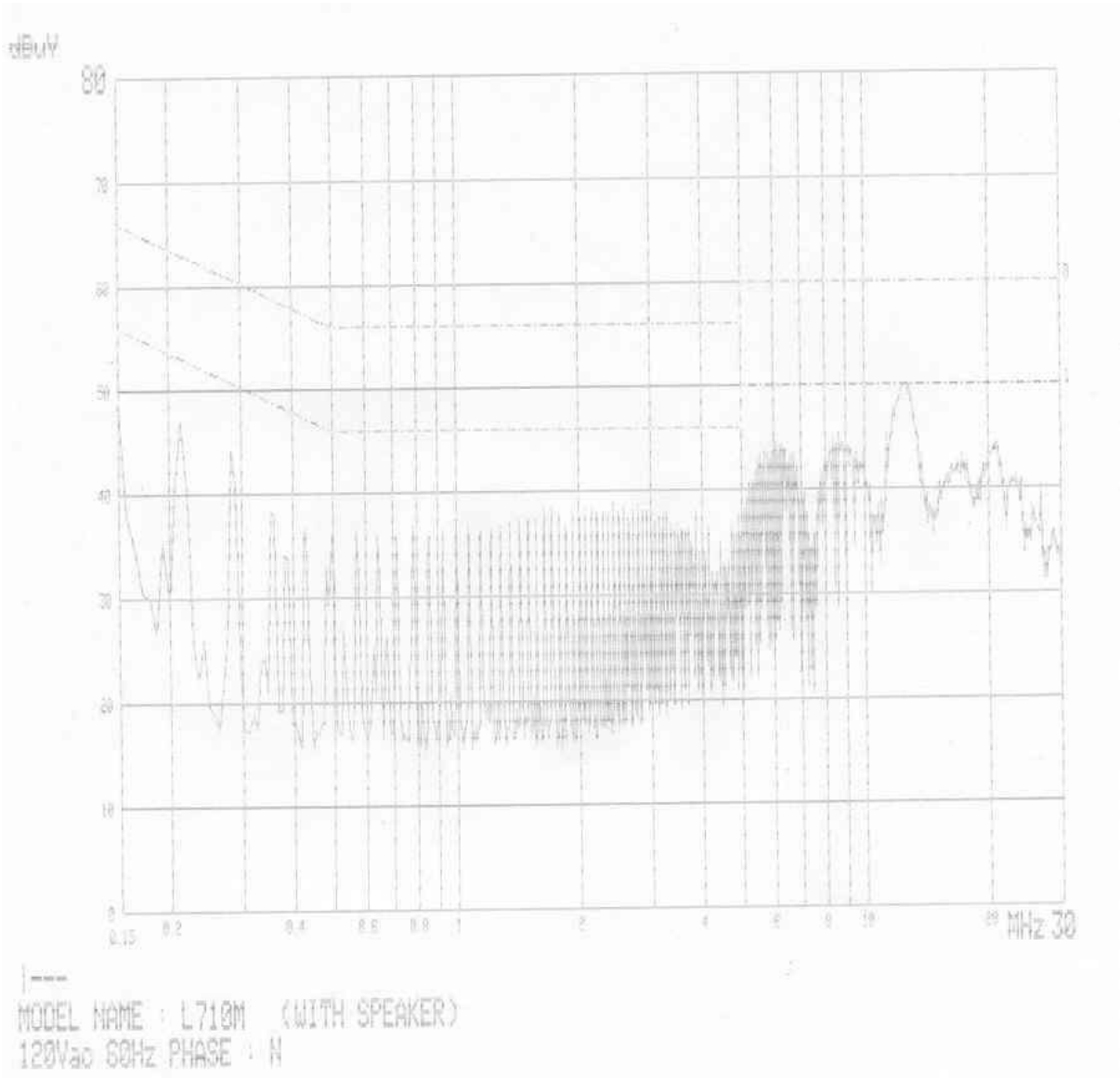

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Conducted Emission Test Data

Type	L710M (without speaker)	
Manufacturer	DAEWOO Lucoms Co., Ltd	
Operation mode	Scrolling "H" pattern display at 1280 x 1024, 75Hz	
Environmental Conditon	Temperature	: 19°C
	Humidity	: 40%
	Atmospheric pressure	: 1011mbar
Date	Jan. 27, 2004	

Highest Emissions ralative to the limit

Frequency [MHz]	Reading [dBμV]		Phase	Insertion Loss (LISN)	Limit [dBμV]		Margin [dB]	
	Q-peak	AV			Q-peak	AV	Q-peak	AV
0.212	42.3	39.1	L1	0.8	63.1	53.1	20.0	13.2
0.282	38.3	35.1		0.8	60.8	50.8	21.7	14.9
2.046	38.4	38.0		0.8	56.0	46.0	16.8	7.2
4.937	40.4	38.8		0.8	56.0	46.0	14.8	6.4
7.898	42.9	41.4		0.8	60.0	50.0	16.3	7.8
13.822	42.6	36.3		0.8	60.0	50.0	16.6	12.9
0.211	42.6	39.8	N	0.8	63.2	53.2	19.8	12.6
0.284	40.1	35.4		0.8	60.7	50.7	19.8	14.5
1.903	36.3	35.9		0.8	56.0	46.0	18.9	9.3
4.864	38.0	37.6		0.8	56.0	46.0	17.2	7.6
11.776	43.0	39.2		0.8	60.0	50.0	16.2	10.0
13.324	43.6	35.2		0.8	60.0	50.0	15.6	14.0
Cable loss are less than 0.1 dB								

*L1 : Live Line
**N : Neutral Line
*** **Please refer to data graphs at page 17 ~ 18.**

Coverage factor of k=2 will ensure that the level of confidence will be approximately 95.45%,
Uncertainty U = -3.70 / +3.42 [dB]

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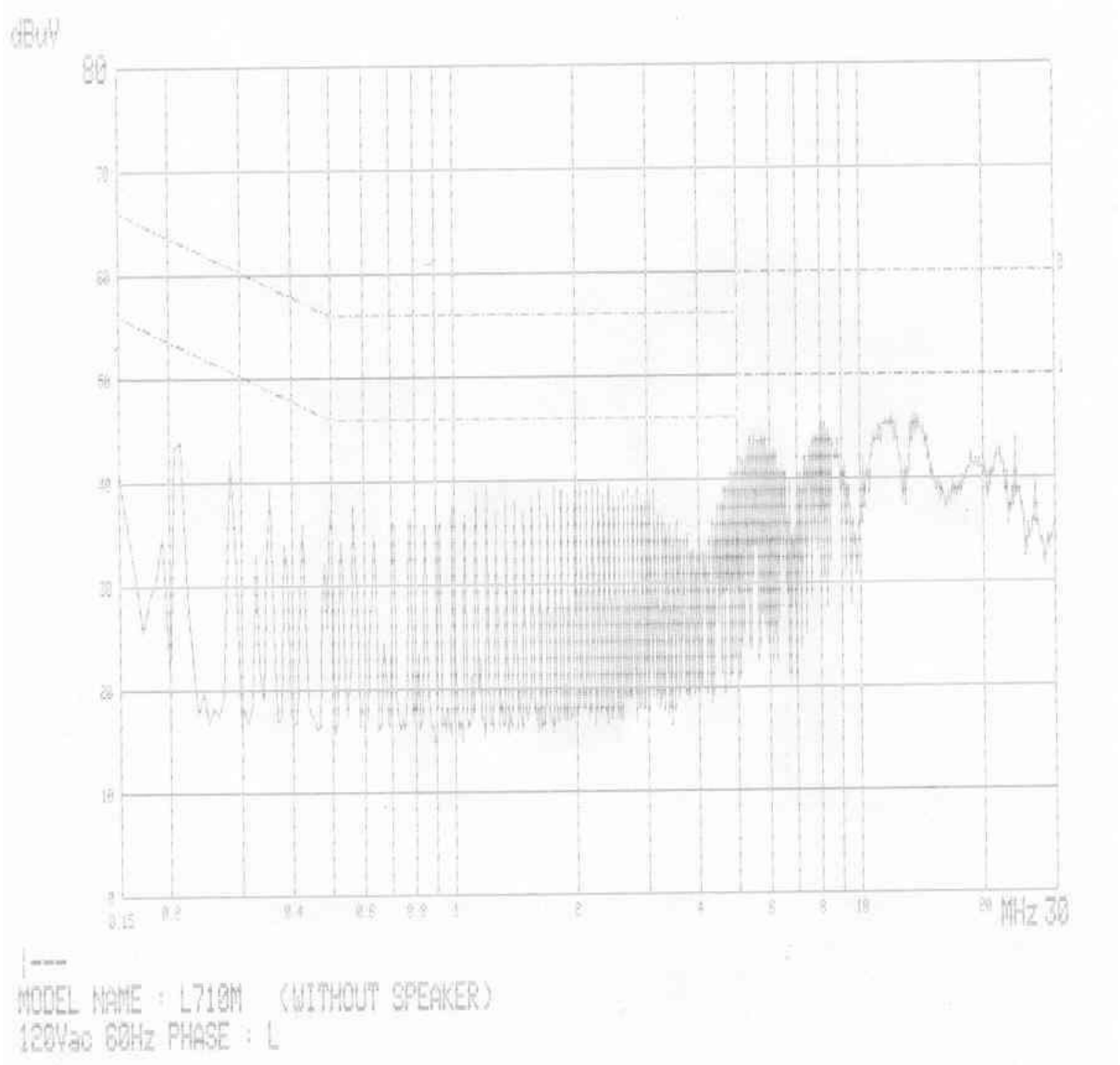

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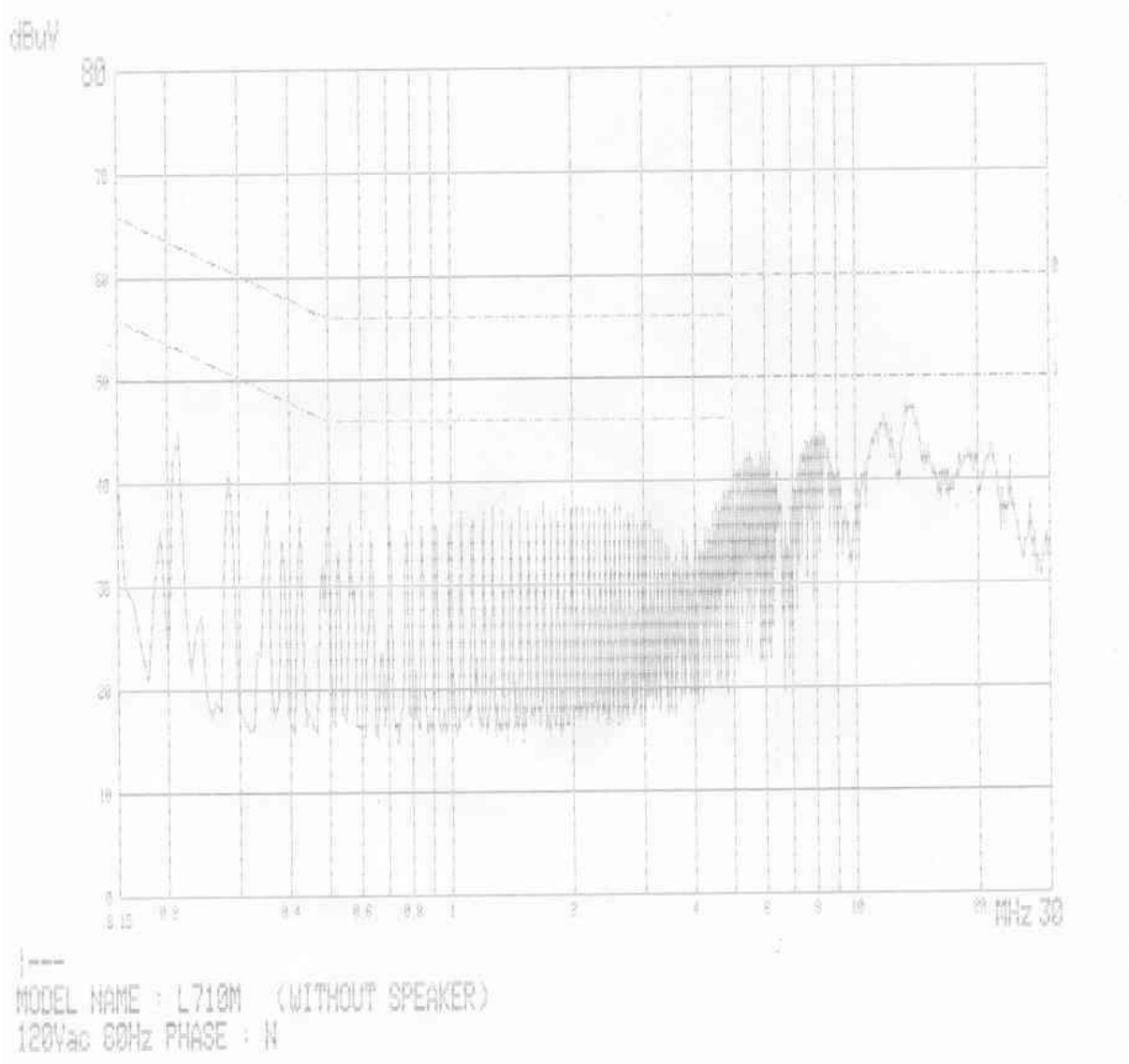

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Radiation Test Data

Type	L710M (with speaker)	
Manufacturer	DAEWOO LUCOMS Co., Ltd	
Operation mode	Scrolling "H" pattern display at 1280 x 1024, 75Hz	
Environmental Conditon	Temperature	: 17 °C
	Humidity	: 39 %
	Atmospheric pressure	: 1010 mbar
Test distance	3 m	
Antenna	VULB9160	
Date	Jan. 29, 2004	

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	Angle [deg]	Height [cm]	Polar [H/V]	Result [dBuV]	Limit [dBuV]	Margin [dB]
72.6	21.4	9.1	1.6	319	100	V	32.1	40.0	7.9
76.3	21.8	8.4	1.6	155	115	V	31.8	40.0	8.2
108.6	17.4	9.1	1.8	158	400	H	28.3	43.5	15.2
120.3	28.6	9.8	2.0	154	100	V	40.4	43.5	3.1
133.6	27.0	10.7	2.1	296	400	H	39.8	43.5	3.7
161.5	17.0	12.3	2.3	297	395	H	31.6	43.5	11.9
200.4	21.9	8.5	2.5	160	106	V	32.9	43.5	10.6
215.4	18.6	8.4	2.6	292	270	H	29.6	43.5	13.9
240.6	20.6	10.2	2.9	135	136	V	33.7	46.0	12..3
268.5	24.0	11.5	2.9	300	100	V	38.4	46.0	7.6
293.8	19.3	11.7	3.1	310	320	H	34.1	46.0	11.9
334.1	16.0	11.7	3.4	295	100	V	31.1	46.0	14.9
362.5	11.4	11.7	3.6	148	105	V	26.7	46.0	19.5
400.9	23.6	13.3	4.3	146	110	V	41.2	46.0	4.8

Coverage factor of k=2 will ensure that the level of confidence will be approximately 95.45%,
Uncertainty U = -5.21 / +4.55 [dB]

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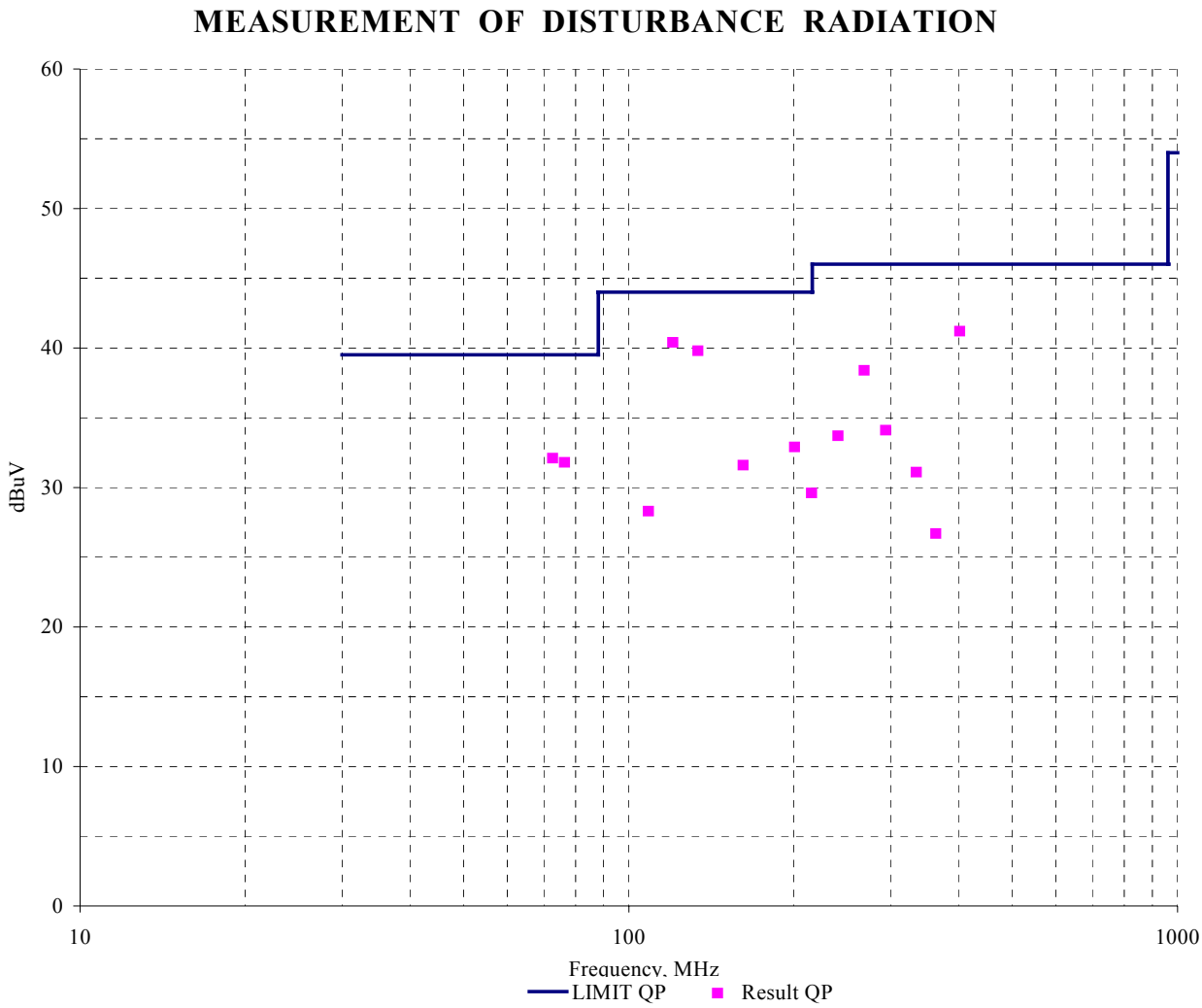

Remark : with speaker

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Radiation Test Data

Type	L710M (without speaker)	
Manufacturer	DAEWOO LUCOMS Co., Ltd	
Operation mode	Scrolling "H" pattern display at 1280 x 1024, 75Hz	
Environmental Conditon	Temperature	: 16 °C
	Humidity	: 38 %
	Atmospheric pressure	: 1010 mbar
Test distance	3 m	
Antenna	VULB9160	
Date	Jan. 30, 2004	

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	Angle [deg]	Height [cm]	Polar [H/V]	Result [dBuV]	Limit [dBuV]	Margin [dB]
72.5	21.5	9.1	1.6	314	100	V	32.2	40.0	7.8
76.2	21.8	8.6	1.6	155	100	V	32.0	40.0	8.0
108.6	17.0	9.1	1.8	158	400	H	27.9	43.5	15.6
120.4	28.3	9.8	2.0	154	100	V	40.1	43.5	3.4
133.5	27.6	10.7	2.1	296	395	H	40.4	43.5	3.1
161.3	16.9	12.3	2.3	297	390	H	31.5	43.5	12.0
200.5	21.7	8.5	2.5	160	106	V	32.7	43.5	10.8
215.3	18.4	8.4	2.6	290	317	H	29.4	43.5	14.1
240.7	20.5	10.2	2.9	135	110	V	33.6	46.0	12.4
268.3	24.2	11.5	2.9	307	105	V	38.6	46.0	7.4
293.7	19.2	11.7	3.1	300	270	H	34.0	46.0	12.0
334.2	16.3	11.7	3.4	298	134	V	31.4	46.0	14.6
362.3	11.2	11.7	3.6	148	120	V	26.5	46.0	19.5
401.0	23.8	13.3	4.3	145	129	V	41.4	46.0	4.6

Coverage factor of k=2 will ensure that the level of confidence will be approximately 95.45%,
Uncertainty U = -5.21 / +4.55 [dB]

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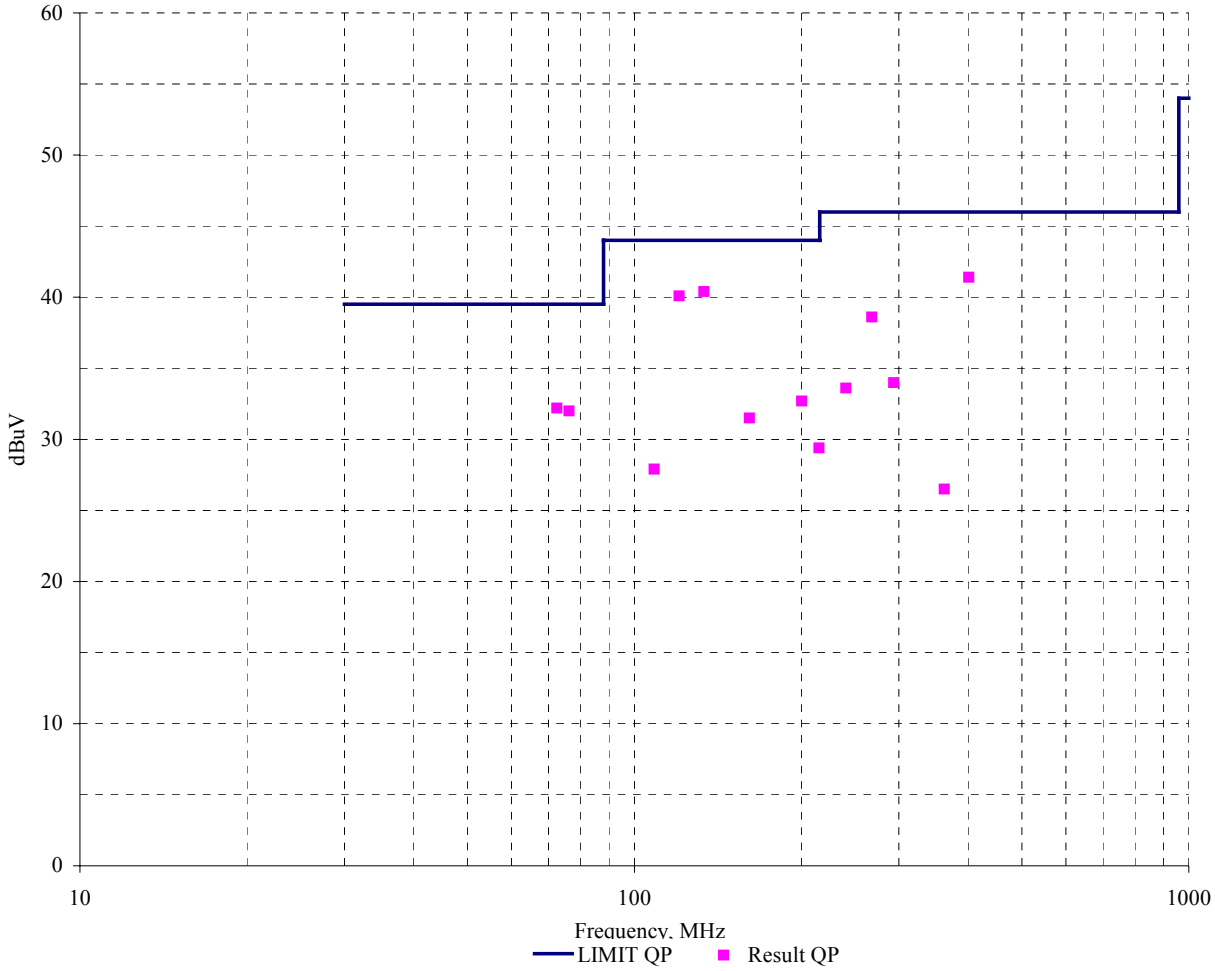
MEASUREMENT OF DISTURBANCE RADIATION



Remark : without speaker

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SUMMARY

GENERAL REMARKS :

The equipment is not modified anything, mechanical or circuit to improve EMI status during a measurement and complied the regulation "Part 15 subpart B Class B of CFR 47"

FINAL JUDGMENT :

The requirements according to the technical regulations are

☒ Kept ☐ Not kept

The equipment under test does

☒ Fulfill the general approval requirements mentioned on page 3.
☐ Not fulfill the general approval requirements mentioned on page 3.

Begin of testing : Jan. 26, 2004

End of testing : Jan. 31, 2004

Reviewed by :

Sung J. Cho. EMC Manager
IST EMC Lab.

Approved by :

G. Chung Chief of EMC Lab.

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