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. : **02-IST-044/FB** Date of issue : Mar. 08, 2002

Model / Type No. : 907D ■ Basic □ Alternate

Kind of product : 19" Color Display Monitor

Brand name : Daewoo

Applicant : Daewoo Electronics Co., Ltd. Display Business Division

Manufacturer : Daewoo Electronics Co., Ltd. Display Business Division

License holder : Daewoo Electronics Co., Ltd. Display Business Division

Address : 543, Dangjung-Dong, Kunpo-City, Kyonggi-Do, Korea

Test result according to the regulation(s)

■ Positive □ Negative

at page 3.

This test report with appendix consists of 17 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 C63.4-1992.

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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 :

CDT :	Orion CDT CDT Size: 19 inch Diagonal visible image area: 18 inch Dot Pitch: 0.25 mm
Frequency Range :	Vertical: 50 ~ 160 Hz, Horizontal: 30 ~ 95 kHz
Plug and Play :	VESA DDC Compatible
Power Saving :	EPA, VESA DPMS, Nutek Compliant
Power Supply Input :	100 ~ 240 Vac, 50/60 Hz (Free Voltage)
Power consumption :	120 W
Dimensions (W x H x D) :	444 x 459.5 x 460 (set with stand)

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 98,
Test mode : 1600 X 1200, 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
Mouse1	M-S48A	HP	LZE01252034
Printer	A0302384	Northern Telecom	2633S60168
Mouse2	M-MD14-2	Logitech	N/A

Connecting Interface Cables :
- Unshielded AC power cable : 1.8 m
- Shielded monitor's signal cable : 1.5 m
- Shielded printer's signal cable : 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	Jun. 16, 2001	861742/015
3725/2	LISN	EMCO	Jul. 30, 2001	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 26, 2001	8-883-10
ESH 3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 13, 2001	357.8810.52

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement Procedures :

Conducted emissions measurments were made in accordance with ANSI C-63.4-1992, "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 0.45MHz 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 C63.4-1992 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	Jun. 12, 2001	861744/018
VULB 9160	Antenna	Schwarzbeck	Jun. 04, 2001	3048

Test - accessories :

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

Measurement procedures

Radiated measurements were in accordance with ANSI C63.4-1992 “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 : 450 kHz - 30 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

3.7 dB at 4.048 MHz

Remarks : See test-graph to be attached at pages 12 ~ 14.

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

3.8 dB at 345.6 MHz

Remarks : See test-data at page 15 ~ 16.

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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 (Photos)

Type : 907D

Conducted Emissions 0.15 MHz - 30 MHz

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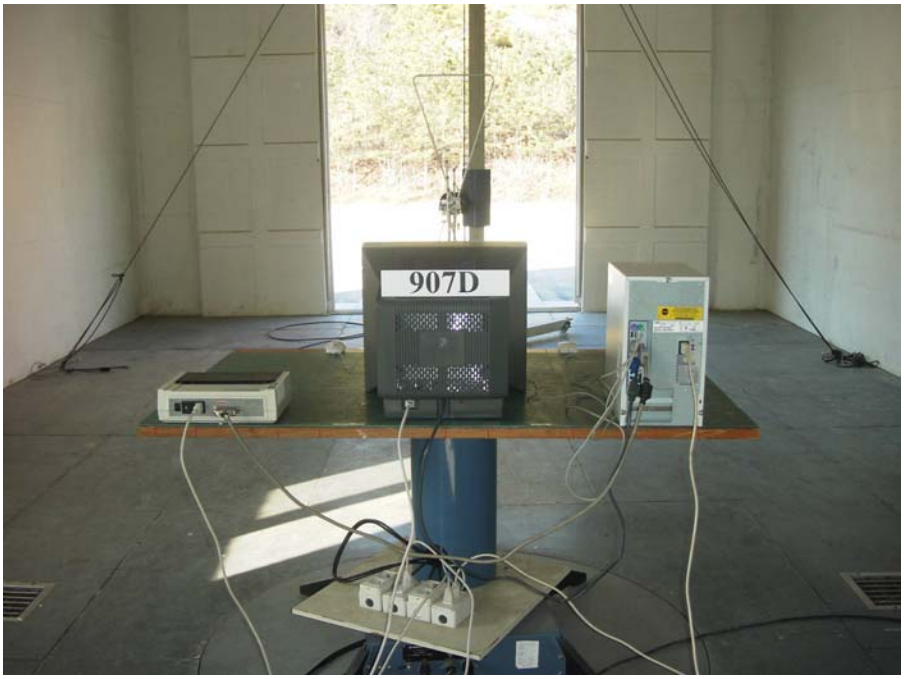
TEST SETUP (Photos)

Type : 907D

Radiated Emissions 30 MHz - 1000 MHz



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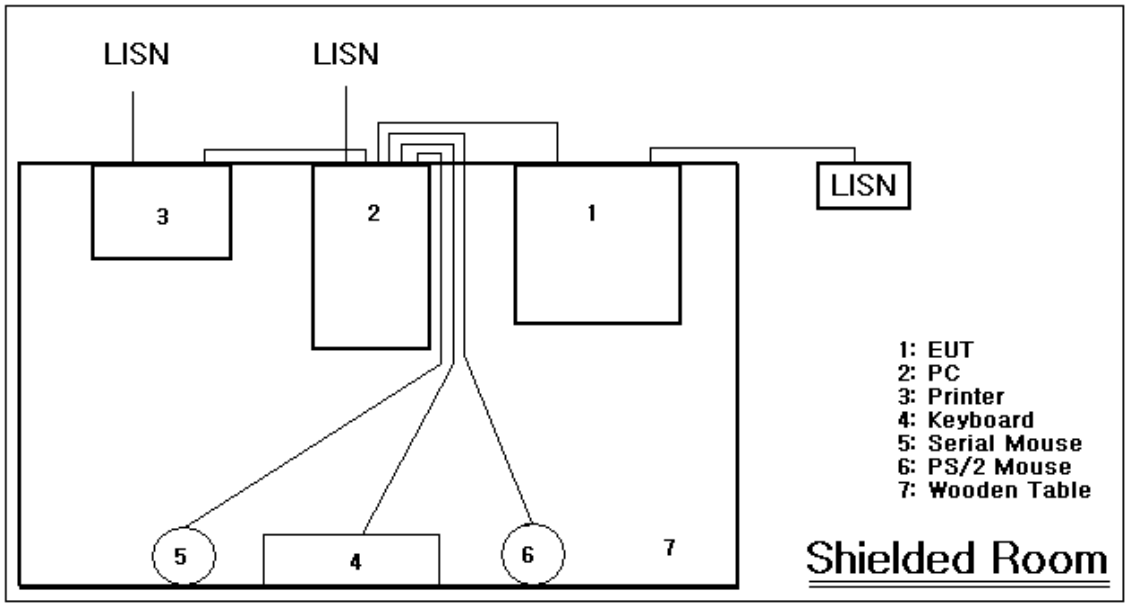
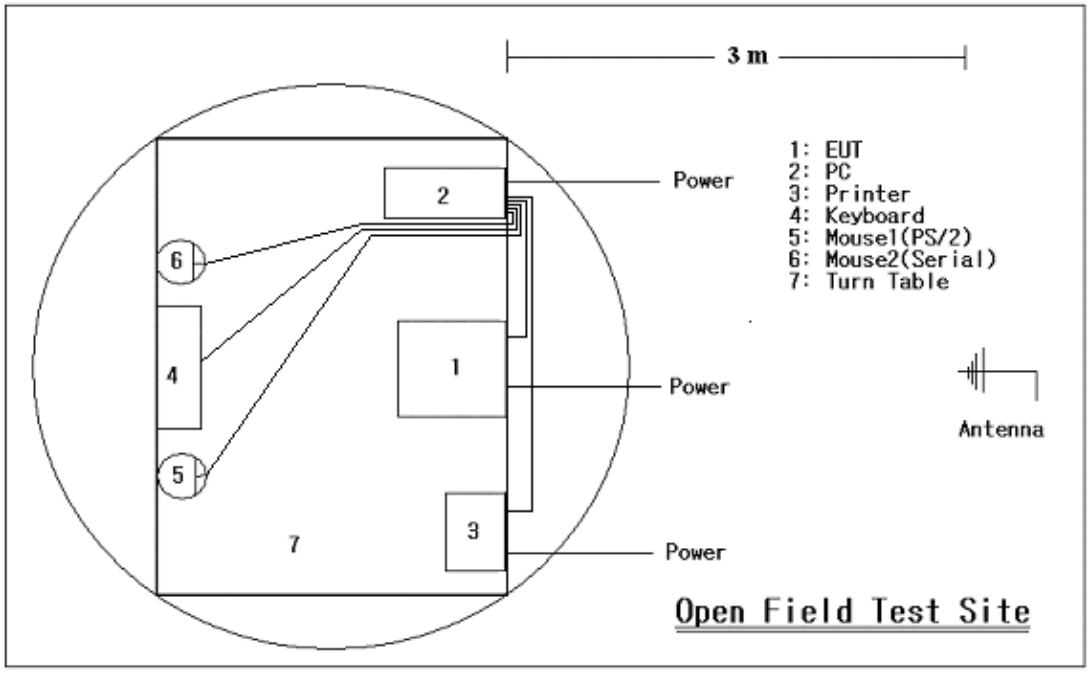
TEST SETUP (Drawings)

Type : 907D



Conducted Emissions 0.45 MHz - 30 MHz



Radiated Emissions 30 MHz - 1000 MHz

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Conducted Emission Test Data

Type	907D	
Manufacturer	Daewoo Electronics Co., Ltd. Display Business Division	
Operation mode	Scrolling "H" pattern display 1600 x 1200, 75Hz	
Environmental Conditon	Temperature	: 18 °C
	Humidity	: 43 %
	Atmospheric pressure	: 1001 mbar
Date	Feb. 19, 2002	

Highest Emissions ralative to the limit

Frequency [MHz]	Reading [dBμV]	Insertion loss [dB]	Phase (L1/N)	Result [dBμV]	Limit [dBμV]	Margin [dB]
0.941	39.1	0.8	L1	39.9	48.0	8.1
1.130	35.5	0.8		36.3	48.0	11.7
1.600	40.6	0.8		41.4	48.0	6.6
3.201	42.3	0.8		43.1	48.0	4.9
4.048	43.5	0.8		44.3	48.0	3.7
16.286	41.7	0.8		42.5	48.0	5.5
0.942	41.8	0.8	N	42.6	48.0	5.4
1.600	42.0	0.8		42.8	48.0	5.2
2.730	40.4	0.8		41.2	48.0	6.8
4.236	43.4	0.8		44.2	48.0	3.8
6.495	34.9	0.8		35.7	48.0	12.3
19.203	37.5	0.8		38.3	48.0	9.7
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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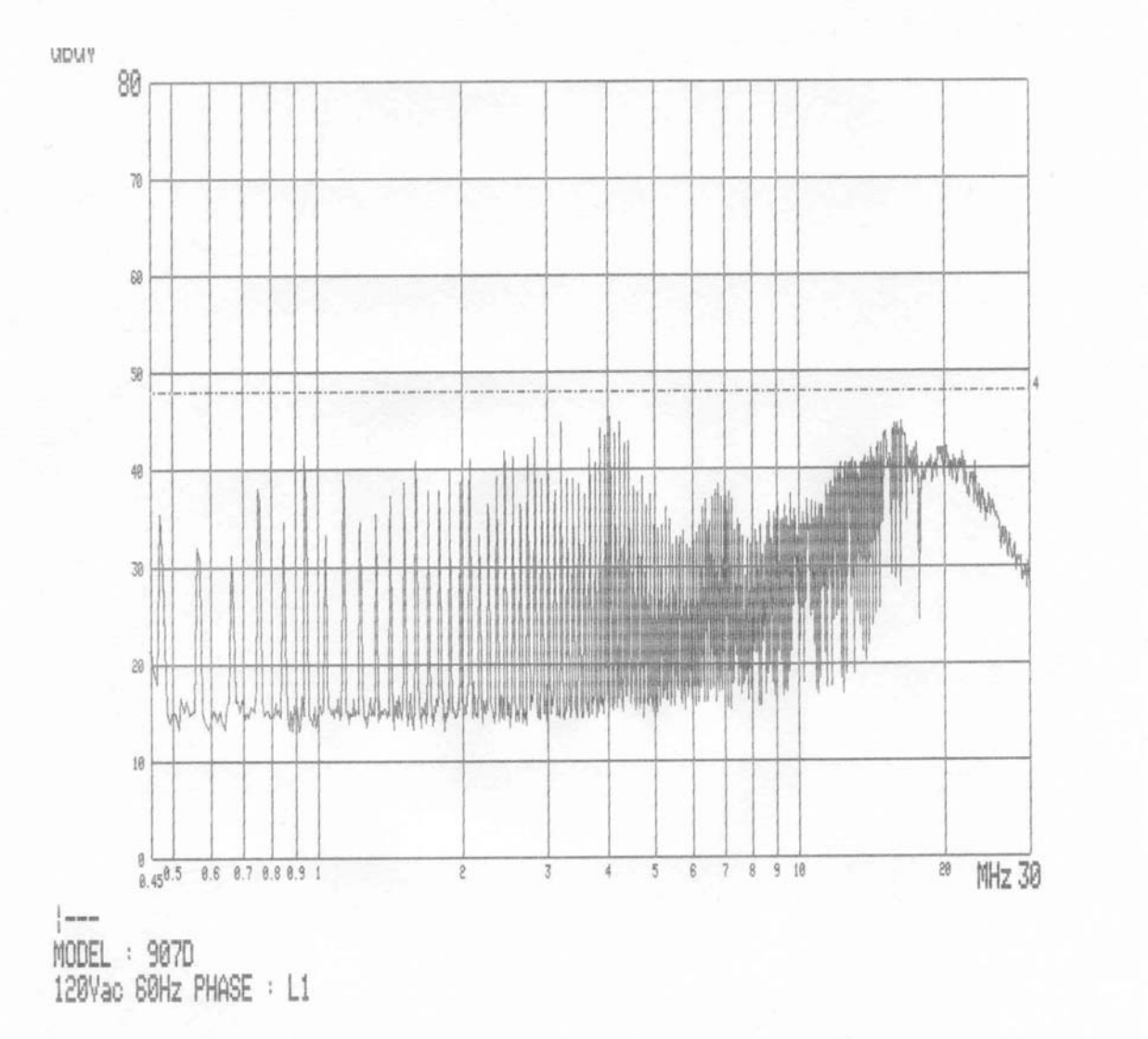

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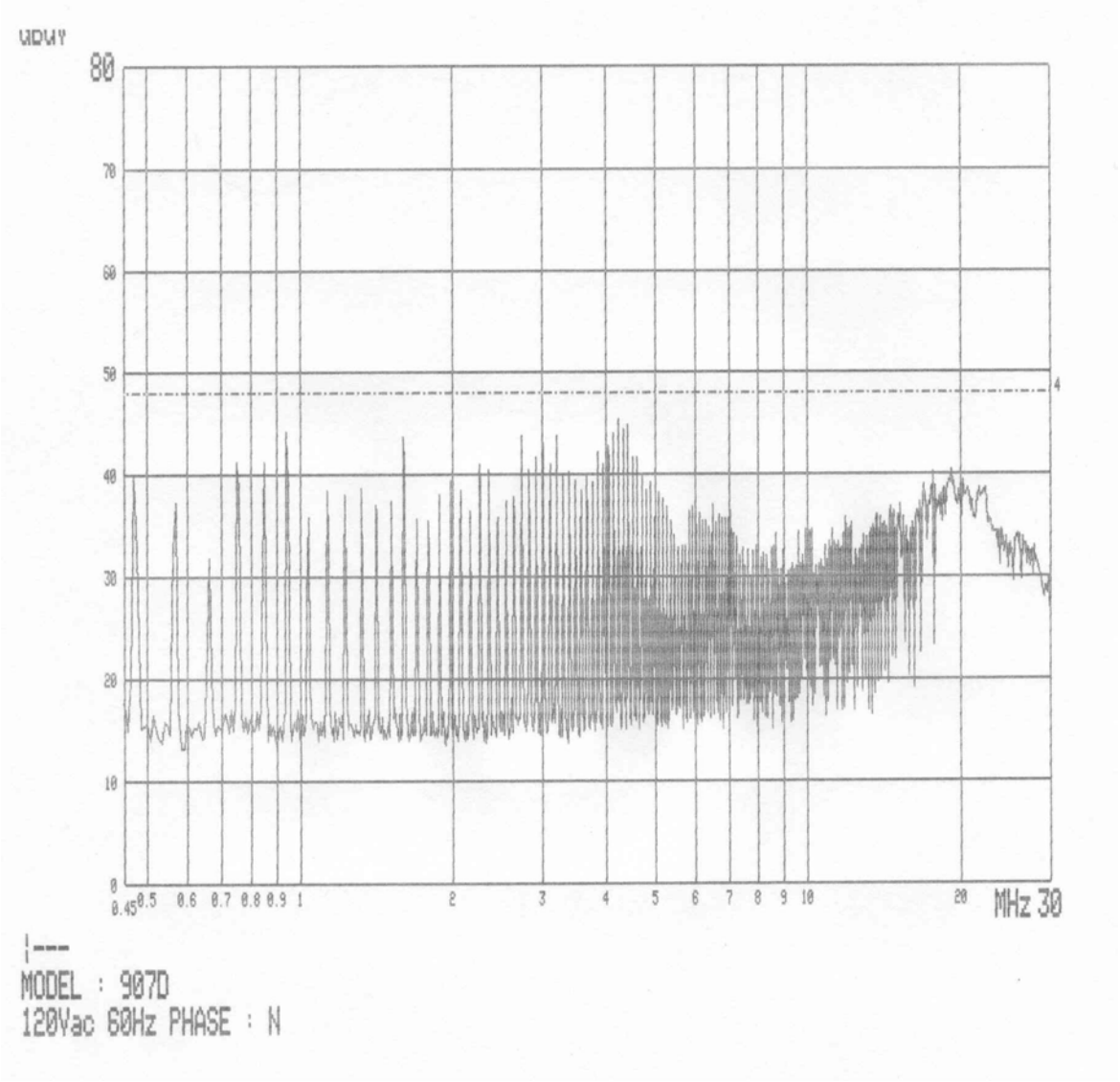

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Radiation Test Data

Type	907D
Manufacturer	Daewoo Electronics Co., Ltd. Display Business Division
Operation mode	Scrolling "H" pattern display 1600 x 1200, 75Hz
Environmental Conditon	Temperature : 17 °C
	Humidity : 42 %
	Atmospheric pressure : 1001 mbar
Test distance	3 m
Antenna	VULB9160
Date	Feb. 27, 2002

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	Angle [deg]	Height [cm]	Polar [H/V]	Result [dBuV]	Limit [dBuV]	Margin [dB]
61.0	23.3	11.3	1.4	183	100	V	36.0	40.0	4.0
101.7	24.0	8.5	1.8	247	100	V	34.3	43.5	9.2
142.3	22.6	11.7	2.2	239	100	V	36.5	43.5	7.0
203.3	23.2	8.5	2.5	169	100	V	34.2	43.5	9.3
244.0	28.5	10.4	2.9	190	400	H	41.8	46.0	4.2
264.3	24.6	11.4	2.9	172	381	V	38.9	46.0	7.1
305.0	24.4	11.7	3.3	306	100	V	39.4	46.0	6.6
325.3	23.5	11.7	3.4	325	106	V	38.6	46.0	7.4
345.6	26.9	11.7	3.6	324	256	V	42.2	46.0	3.8
406.6	22.3	13.3	4.3	244	116	V	39.9	46.0	6.1
447.3	23.6	13.9	4.5	179	100	V	42.0	46.0	4.0
467.6	18.6	14.3	4.7	172	148	V	37.6	46.0	8.4
508.3	18.3	15.1	4.8	143	100	V	38.2	46.0	7.8

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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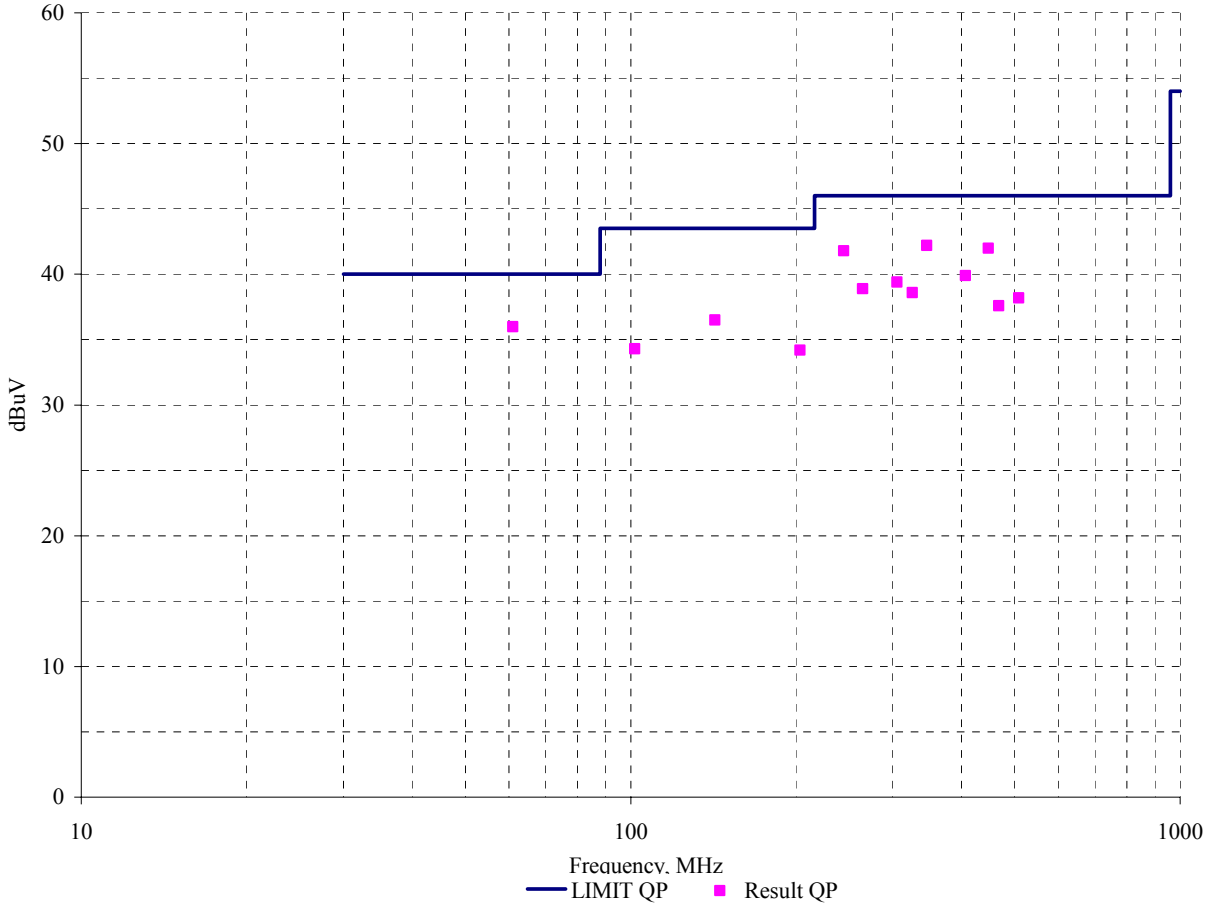
MEASUREMENT OF DISTURBANCE RADIATION



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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 : Feb. 15, 2002

End of testing : Mar. 05, 2002

Reviewed by :

Joon H, Lee. EMC Manager
Daewoo EMC Lab.

Approved by :

G, Chung. Chief of EMC Lab.

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