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. : **03-IST-316/FB** Date of issue : Dec. 12, 2003

Model / Type No. : DPS-4224LVS ■ Basic ☐ Alternate

Kind of product : PDP(Plasma Display Panel)

Brand name : DAEWOO

Applicant : Daewoo Electronics Corp.

Manufacturer : Daewoo Electronics Corp.

License holder : Daewoo Electronics Corp.

Address : 543, Dangjeong-dong, Gunpo-shi, Gyonggi-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

IST EMC Lab.
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EQUIPMENT UNDER TEST

Equipment Description :

Diagonal Size :	106cm (42")
Dimensions :	1044(W) x 631(H) x 83(D) mm
Display Resolution :	1.08(H) x 1.08(V)mm
Video Signal :	NTSC, PAL, SECAM, PAL-M/N, NTSC4.43
Power Requirement :	AC 100~240V, 50/60Hz
External port :	Component IN(2), Video IN(2), S-Video IN(2), PC D-sub IN(1), PC DVI-D IN(1), Speaker Out(2)
Weight :	28kg (61.73Lbs)

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 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	Vectra VL420MT	HP	SG23101785
Keyboard	SK-2502C	HP	M020321157
PS/2 Mouse	M-S48A	HP	LZE20602910
Serial Mouse	M-M28	Logitech	LCA53305547
Printer	A0302384	Northen Telecom	2633S60168

Connecting Interface Cables & Ports :
- Shielded monitor's signal cable : 2.8m
- S-Video Cable : 1.5m (75Ω, 620Ω Termination)
- RCA Cables : 1.5m (75Ω(Video IN), 47kΩ(Audio IN) Termination)
- Speaker Cables : 2.3m

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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
3725/2	LISN	EMCO	Jul. 23, 2003	9101-2068
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 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 0.15MHz 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 :

J.H.Park / 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	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 C63.4-1992 “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 :

J.H.Park / 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

7.6 dB at 0.160 MHz

Remarks : See test-data at pages 12 ~ 14.

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are.

☒ KEPT ☐ NOT KEPT

Min. limit margin

4.4 dB at 38.3 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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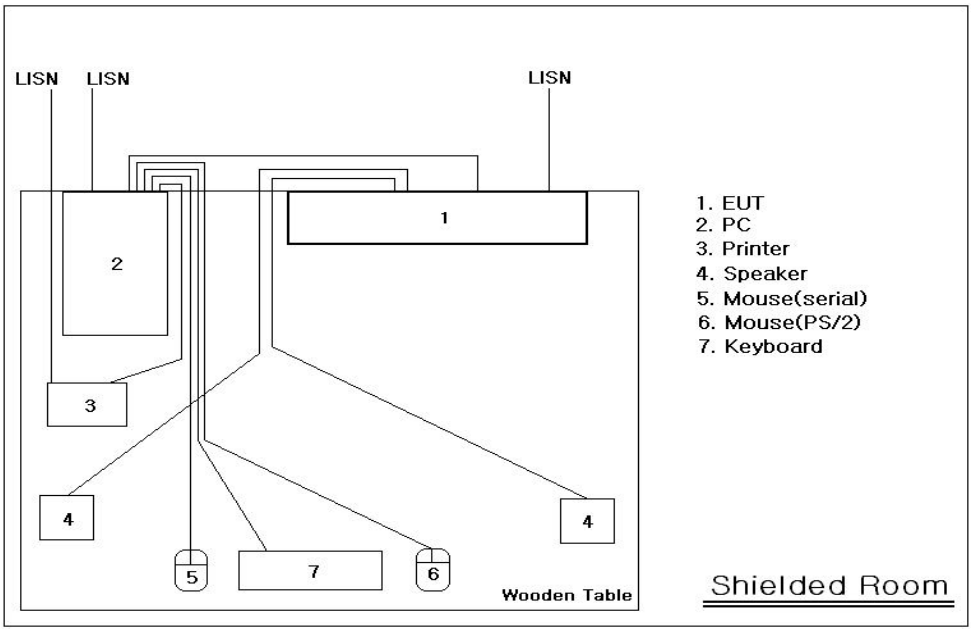
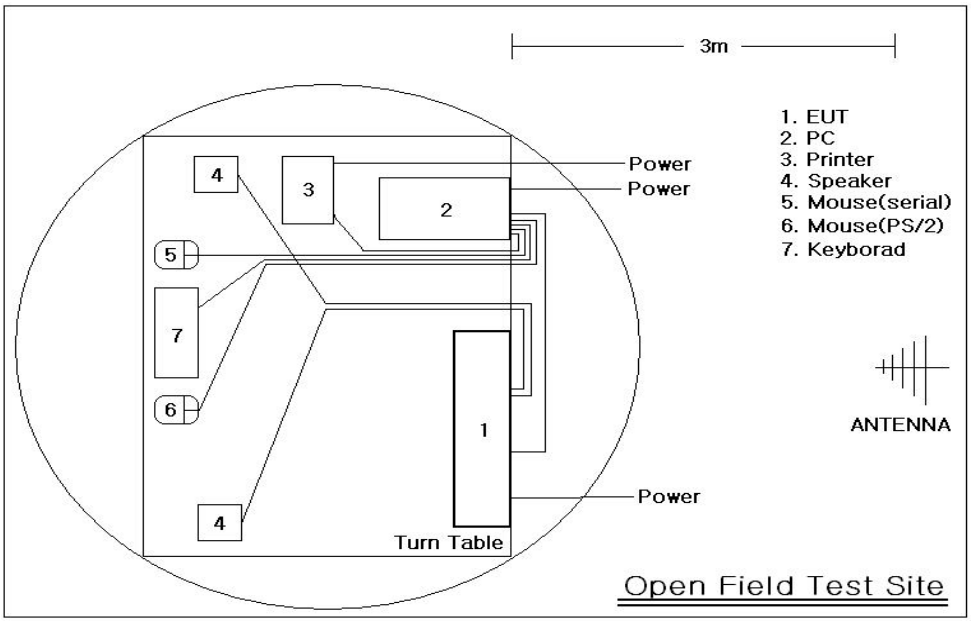
TEST SETUP (Drawings)

Type : DSP-4224LVS



Conducted Emissions 150kHz - 30 MHz



Radiated Emissions 30 MHz - 1000 MHz

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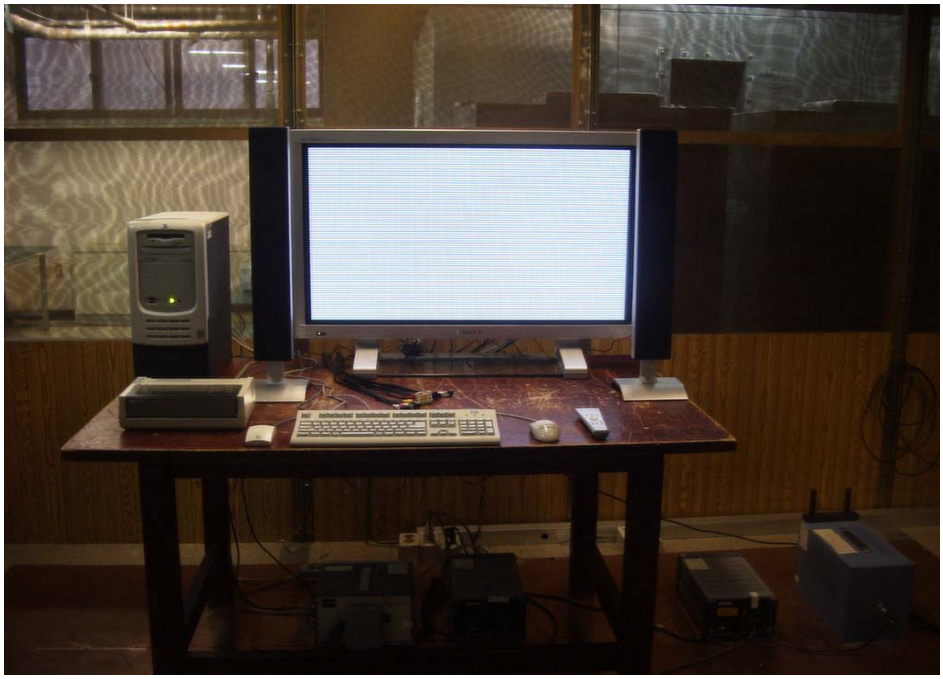
TEST SETUP (Photos)

Type : DSP-4224LVS



Conducted Emissions 150kHz - 30 MHz

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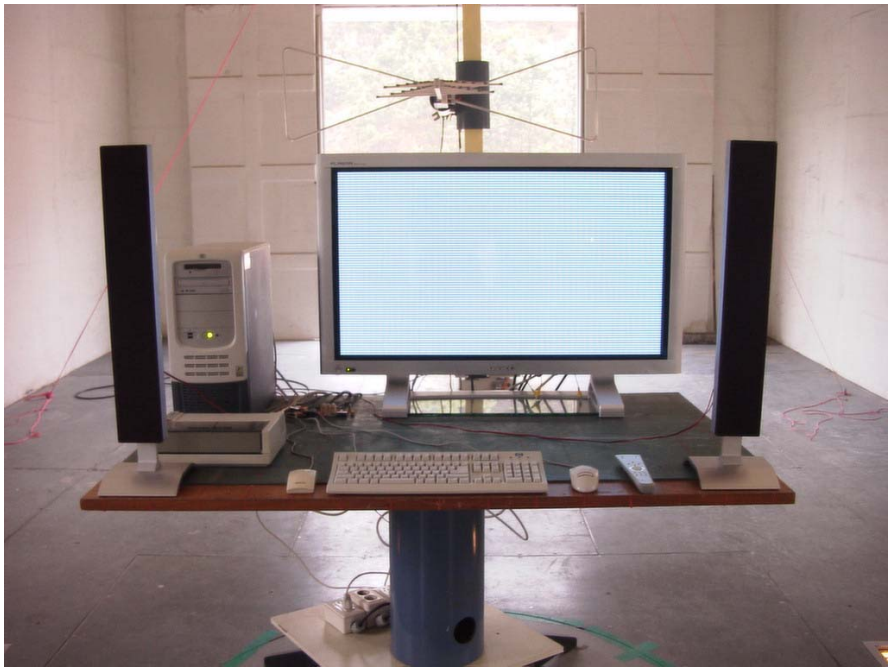
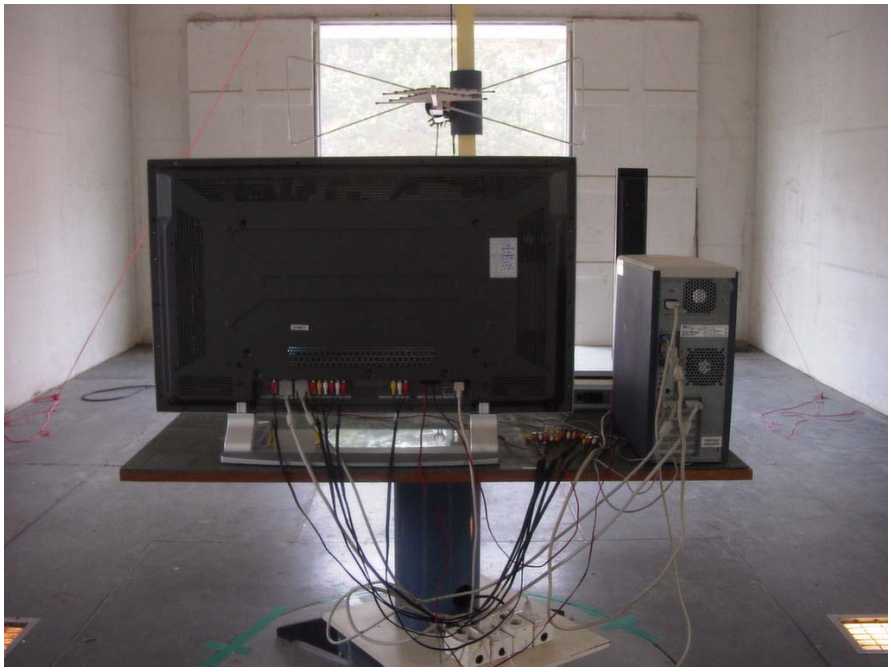
TEST SETUP (Photos)

Type : DSP-4224LVS



Radiated Emissions 30MHz - 1000 MHz



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Conducted Emission Test Data

Type	DSP-4224LVS	
Manufacturer	Daewoo Electronics Corp.	
Operation mode	Scrolling "H" pattern display at 1600 x 1200, 75Hz	
Environmental Conditon	Temperature	: 17 °C
	Humidity	: 41 %
	Atmospheric pressure	: 1014 mbar
Date	Nov. 26, 2003	

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
0.160	57.1	43.8	L1	0.8	65.5	55.5	7.6	10.9
0.296	38.4	35.8		0.8	60.4	50.4	21.3	13.9
1.523	35.0	10.7		0.8	56.0	46.0	20.2	34.5
4.348	28.4	9.8		0.8	56.0	46.0	26.8	35.4
13.755	37.1	16.1		0.8	60.0	50.0	22.1	33.1
20.232	30.0	13.5		0.8	60.0	50.0	29.2	35.7
0.160	54.5	41.2	N	0.8	65.5	55.5	10.2	13.5
0.295	32.7	25.1		0.8	60.4	50.4	26.9	24.5
1.521	37.7	10.8		0.8	56.0	46.0	17.5	34.4
6.039	28.3	18.0		0.8	60.0	50.0	30.9	31.2
13.633	37.2	17.2		0.8	60.0	50.0	22.0	32.0
20.232	31.1	14.5		0.8	60.0	50.0	28.1	34.7
Cable loss are less than 0.1 dB								

*L1 : Live Line

**N : Neutral Line

*** **Please refer to data graphs at page 13 ~ 14.**

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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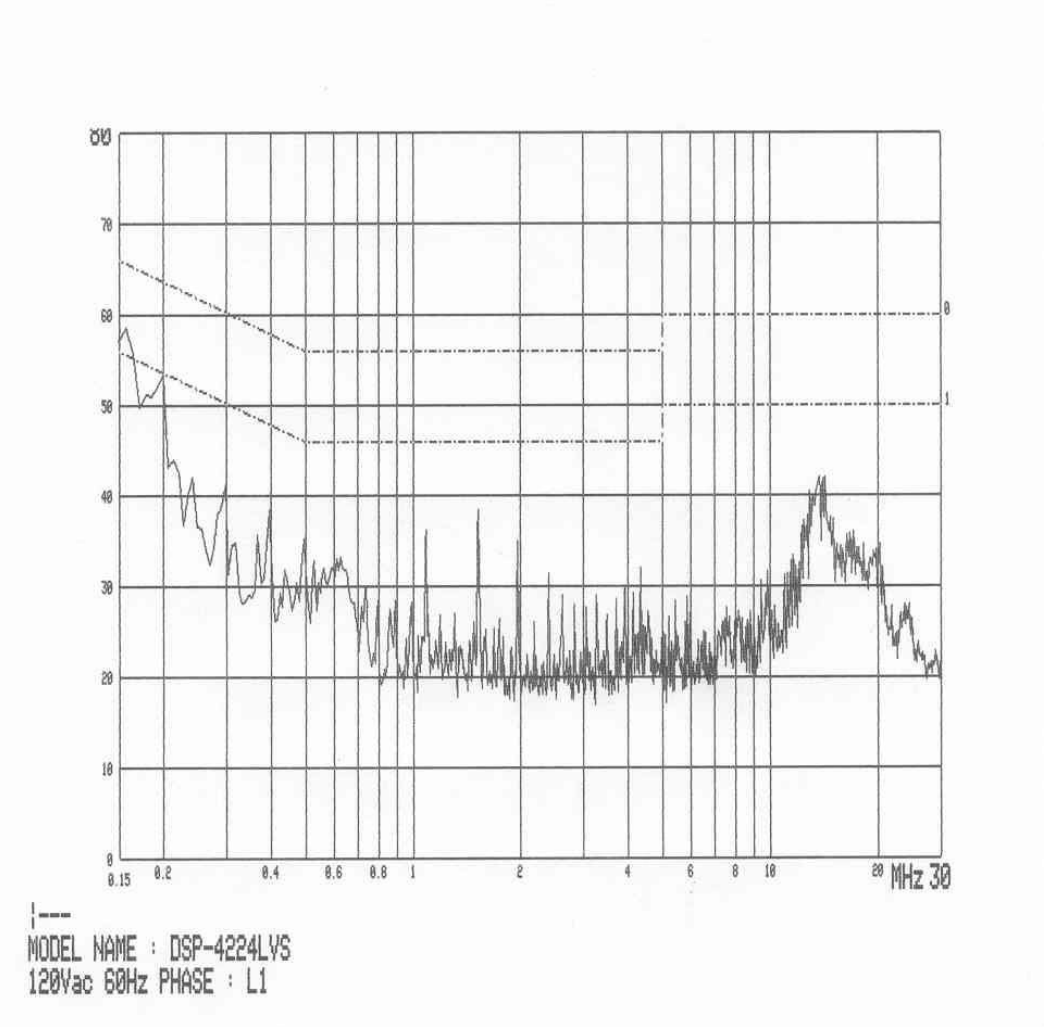

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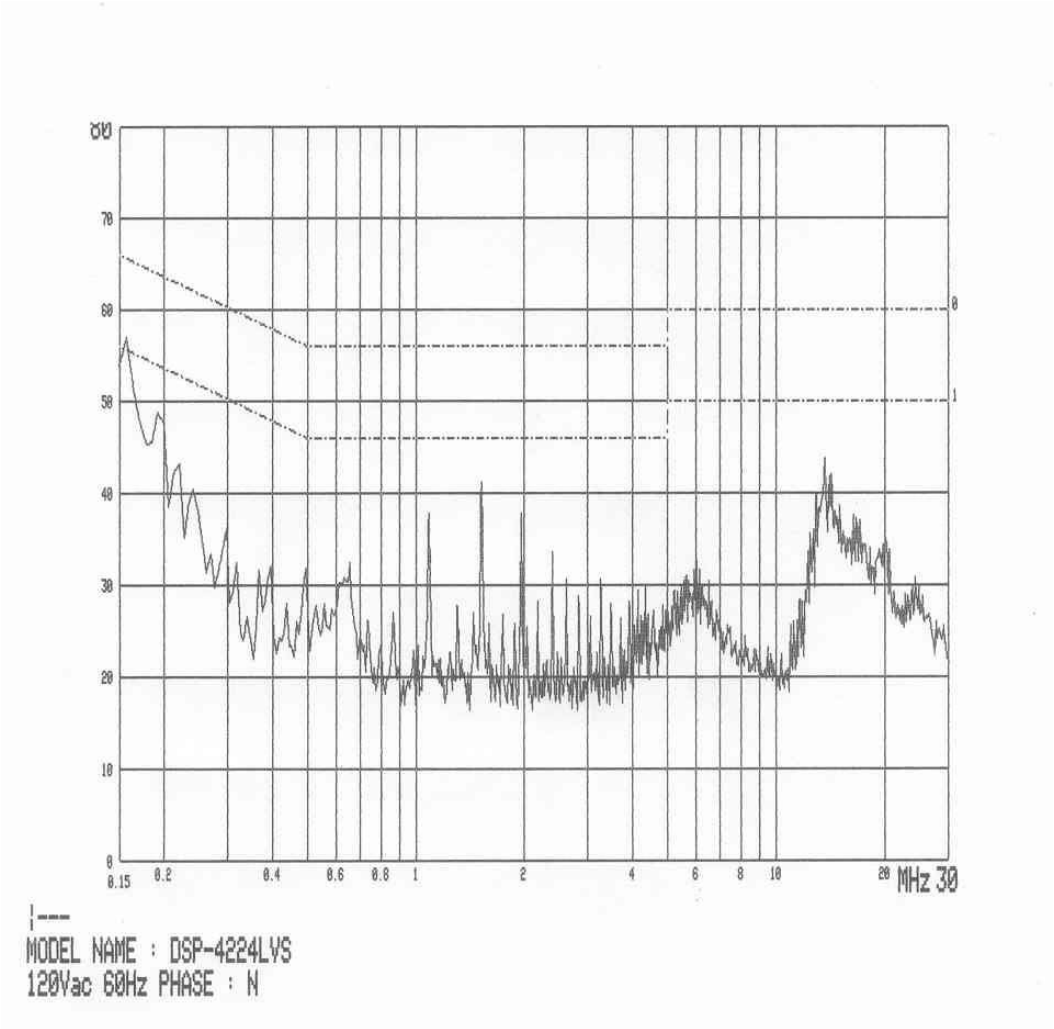

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Radiation Test Data

Type	DSP-4224LVS	
Manufacturer	Daewoo Electronics Corp.	
Operation mode	Scrolling "H" pattern display at 1600 x 1200, 75Hz	
Environmental Conditon	Temperature	: 13 °C
	Humidity	: 41 %
	Atmospheric pressure	: 1014 mbar
Test distance	3 m	
Antenna	VULB9160	
Date	Dec. 02, 2003	

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	Angle [deg]	Height [cm]	Polar [H/V]	Result [dBuV]	Limit [dBuV]	Margin [dB]
38.3	21.0	13.5	1.1	265	110	V	35.6	40.0	4.4
50.7	18.6	10.5	1.3	192	110	V	30.4	40.0	9.6
59.4	19.7	11.2	1.3	186	115	V	32.2	40.0	7.8
69.2	22.6	9.8	1.5	186	105	V	33.9	40.0	6.1
130.6	10.3	10.5	2.1	188	245	H	22.9	43.5	20.6
142.2	10.5	11.6	2.2	192	145	V	24.3	43.5	19.2
197.0	9.7	8.7	2.5	182	150	V	20.9	43.5	22.6
246.3	14.7	10.5	2.8	185	185	H	28.0	46.0	18.0
253.7	12.9	10.9	2.8	171	107	V	26.6	46.0	19.4
304.4	12.8	11.7	3.3	245	113	V	27.8	46.0	18.2
400.0	15.9	13.3	4.3	298	112	V	33.5	46.0	12.5
608.4	6.9	17.0	4.7	331	126	V	28.6	46.0	17.4
639.0	6.5	17.0	4.8	335	132	V	28.3	46.0	17.7
659.5	7.8	17.0	4.9	324	130	V	29.7	46.0	16.3

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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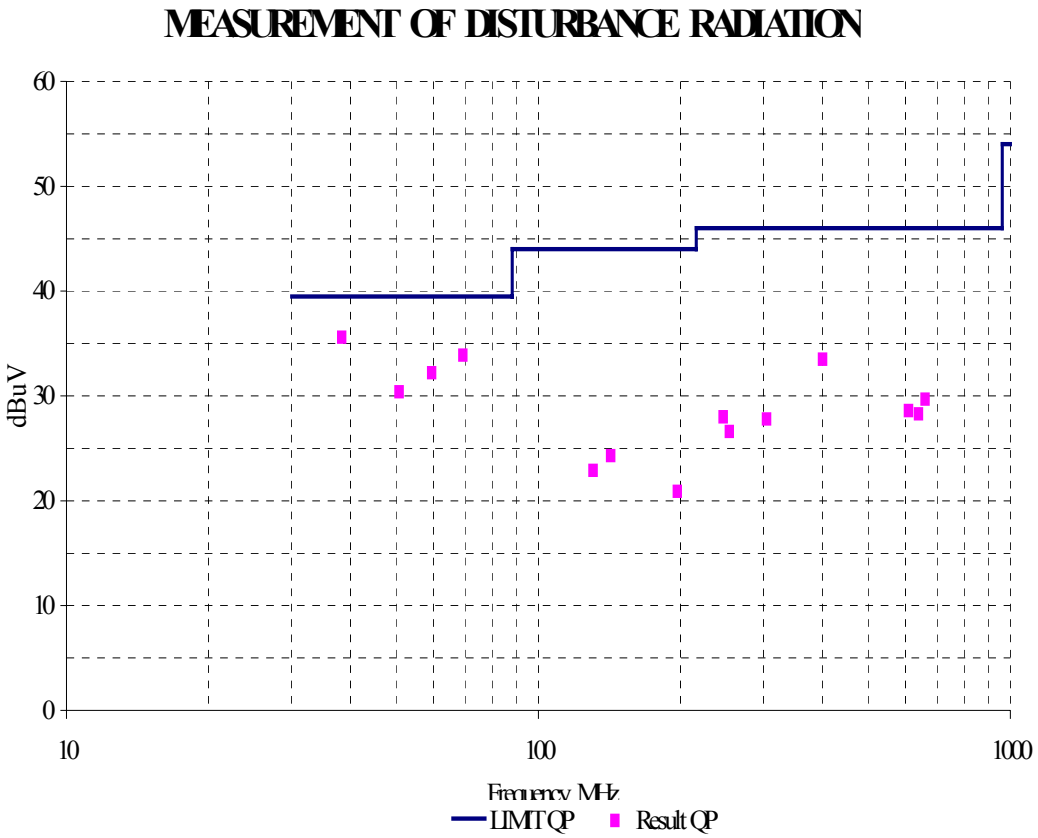

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SUMMARY

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 : Nov. 26, 2003

End of testing : Dec. 02, 2003

Reviewed by : **Approved by :**

Joon H. Lee. EMC Manager
IST EMC Lab.

G. Chung Chief of EMC Lab.

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