

# Certification of Compliance

## CFR 47 Part 15 Subpart B

Test Report File No. : 08-IST-0238

Date of Issue : April 28, 2008

FCC ID : QZFL2200

Model(s) : L2200  Basic  Alternate

Kind of Product : LCD WIDE MONITOR

Applicant : DAEWOO Lucoms Co., Ltd.

Address : 1201~4 AceTechnoTower 5<sup>th</sup>, 197-22 Guro-Dong, Guro-Gu, Seoul, Korea

Manufacturer : DAEWOO Lucoms Co., Ltd.

Address : 1201~4 AceTechnoTower 5<sup>th</sup>, 197-22 Guro-Dong, Guro-Gu, Seoul, Korea

### Test Result

Positive

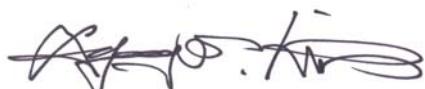
Negative

Reviewed By



S. J. Cho / EMC Group Manager

Approved By



B. S. Kim / Chief

### Comment(s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart B - Unintentional Radiators, Class B.
- The test report with appendix consists of 25 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance 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 2003.



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◆ Radiated Emissions	30 MHz - 1 GHz	Applicable
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Note:

## INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd.

**FCC Filing Lab.:** FCC R-No. 400603, FCC MRA R-No. 801060  
 400-19, Singal-dong, Giheung-gu, Yongin-si, Genggi-do,  
 446-599, Korea  
 TEL : +82 31 326 6700      FAX : +82 31 326 6797

## ENVIRONMENTAL CONDITIONS

Temperature	18.5 °C
Humidity	40 %
Atmospheric pressure	1016 mbar

## POWER SUPPLY SYSTEM USED

Power supply system      AC 120V, 60Hz  
 (Refer to the product information)

## PRODUCT INFORMATION

The Equipment Under Test(EUT) is LCD Wide Monitor QZFL2200 of Daewoo Lucoms.

Panel-LG.PHILIPA (LM220WE1)	Size	22-inch (55.88cm) diagonal
	Pixel Pitch	0.282(H)mm x 0.282(V)mm
	Viewing Angle	160°(H) 160°(V)
	Color Filter	RGB vertical stripe
Synchronization	Horizontal	30 - 80 KHz
	Vertical	56 - 77 Hz
Video Bandwidth		165 MHz
Resolution	Max.	1680 x 1050@ 60Hz
	Optimal	1680 x 1050@ 60Hz
Colors		16.7 M Colors
Display Area		473.76(H)mm x 296.1(V)mm
PC Input	Signal Sync	H/V separate (TTL)
	Video	15 pin mini D-sub(Analog RGB) DVI-D (Optional)
Speaker	Max. Output	Left 3W + Right 3W (Optional)
Plug and Play		VESA DDC Compatible
Power Source		100 - 240 Vac
Power Consumption		50 W (Max.)
Dimension (W x H x D)	with stand	523 x 420 x 156 mm
	without stand	523 x 367 x 66 mm
Weight	net	6.5Kg(14.3 lbs)
	gross	8.7Kg (19.2 lbs)
Power Saving		EPA, VESA DPMS, Nutek Compliant
Tilt Range		5°forward, 30°backward
Operating Temperature		10~40°C / 50~104°F

- EMC suppression device is not used during the test.
- Please refer to user's manual.

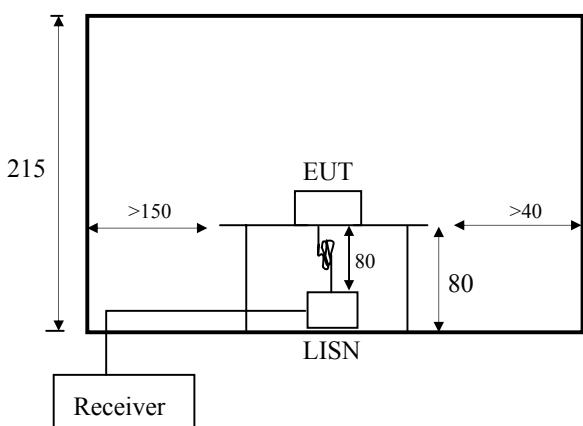
## DESCRIPTIONS OF TEST

### Conducted Emissions:

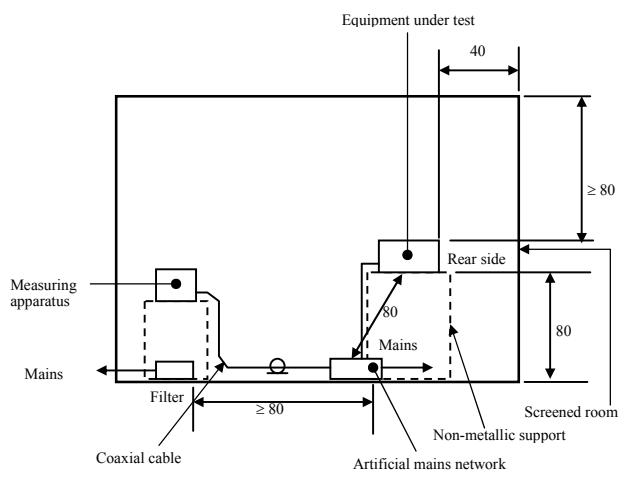
The measurement were performed over the frequency range of 0.15 MHz to 30 MHz using a KNW-407 LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10 KHz or for "quasi-peak" & "Average" within a bandwidth of 9 KHz.

#### -Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1 m X 1.5 m wooden table 80 cm height is placed 40 cm away from the vertical wall and 1.5 m away from the other wall of the shielded room. The ESCI and KNW-407 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the KNW-407 LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner  $\phi$  1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the KNW-407 LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the ESCI receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30 MHz. The bandwidth of the receiver was set to 10 kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



< Side View >



< Concept Drawing >

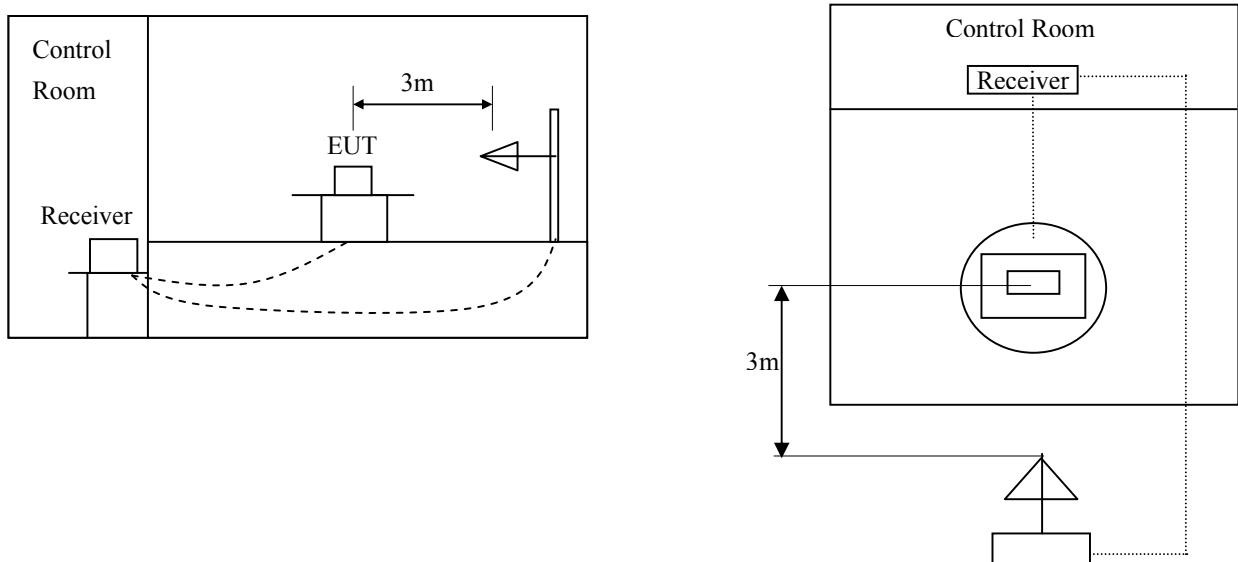
## DESCRIPTION OF TEST

### Radiated Emissions:

The measurement was performed over the frequency range of 30 MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120 KHz.

#### -Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. Emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 MHz to 1000 MHz using bi-log antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. Emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.



## Measurement Uncertainty Calculations

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 ( $\pm$ 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 Receiver	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

$U_{c,\text{minus}} = -1.85$ ,  $U_{c,\text{plus}} = 1.71$

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

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties( $\pm$ 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		
$ \Gamma_{\text{antenna}}  = 0.33$	U-Shaped	-1.0 / +0.9
$ \Gamma_{\text{receiver}}  = 0.33$		
System Repeatability	Std Deviation	0.5
Combined Standard Uncertainty	Normal	-2.6048 / 2.2775
Expanded Uncertainty U	Normal (k=2)	-5.21 / +4.55

$U_{c,\text{minus}} = -2.6048$ ,  $U_{c,\text{plus}} = 2.2775$

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

## Equipment Under Test

### 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 Mode
- Operational Condition : Display scrolling 'H' pattern on the windows
  - 1680x1050, 60 Hz
  - 1280x1024, 60 Hz
  - 1024x768, 60 Hz

### Configuration of the equipment under test :

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

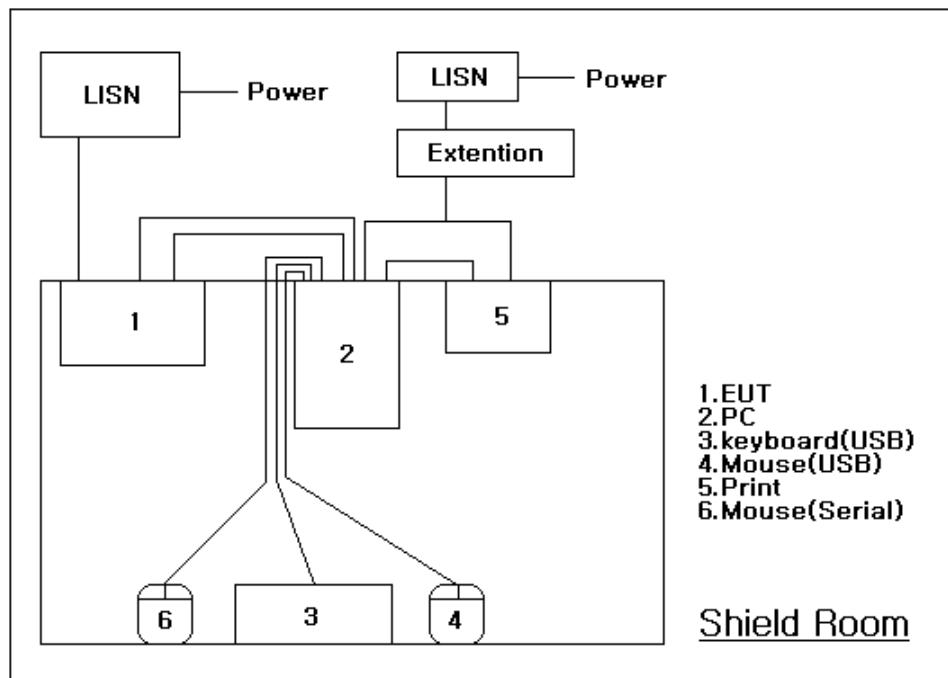
Equipment	Type	Brand	Serial No.	FCC Compliance Info.
PC	Dx6120 MT	HP	CNG52000QL	DOC
Keyboard(USB)	SK-2880	YET FOUNDATION	N/A	DOC
Mouse(USB)	M-UV96a	Logitech	N/A	DOC
Mouse(Serial)	M-MD14-2	Logitech	N/A	DZL210365
Printer	A0302380	Northern Telecom	2516S60951	BS46XU225C-L

### Connecting Interface Cables :

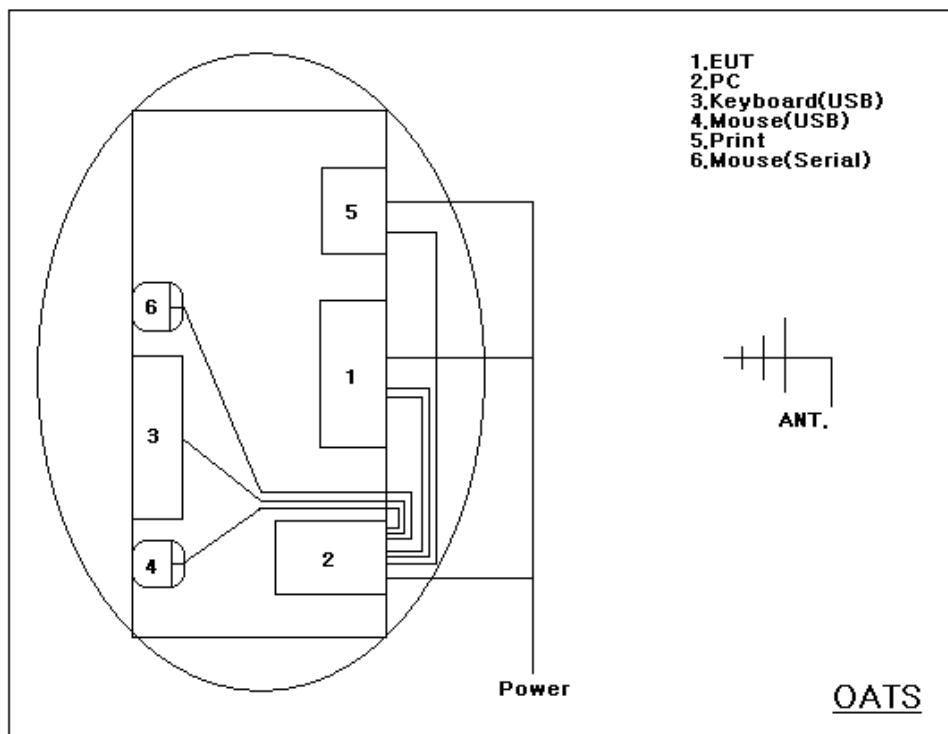
- Unshielded AC power cable : 1.8 m
- Shielded monitor signal(D-sub) cable (with two ferrite core) : 1.8 m.
- Shielded monitor signal(DVI) cable (with two ferrite core) : 1.4 m
- Unshielded Audio cable (With one ferrite core) : 1.5 m
- Unshielded keyboard(USB) signal cable (without ferrite core) : 1.5 m
- Unshielded mouse(USB) signal cable (without ferrite core) : 1.6 m
- Unshielded mouse(Serial) signal cable (without ferrite core) : 1.5 m
- Unshielded printer(Parallel) signal cable (without ferrite core) : 1.8 m

Note :

### Test Set-Up



### Conducted Emissions



### Radiated Emissions

## SUMMARY

### Emissions

#### ■ Conducted Emission

The requirements are  
Minimum limit margin  
Maximum limit exceeding

MET  Not MET  
3.05 dB at 3.51 MHz

**Remarks : Limits are kept with more 3dB margin.**

Find the test data in following pages 11 to 14.

#### ■ Radiated Emission

The requirements are  
Minimum limit margin  
Maximum limit exceeding

MET  Not MET  
5.09 dB at 712.87 MHz

**Remarks : Limits are kept with more 3dB margin.**

Find the DVI & D-sub test data in following page 16 to 19.

### test Date

Begin of testing : April 08, 2008

End of testing : April 11, 2008

Note :

Prepared By



S. J. OH / EMC Engineer

- means the test is applicable,
- is not applicable.

## TEST CONDITIONS AND DATA

### Conducted Emissions

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Calibration Date	Serial Number
ESCI	Test Receiver	Rohde & Schwarz	Jun. 26, 2007	100373
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	May 21, 2007	357.8810.52
KNW-407	LISN	Hyup-Rip	Oct. 11, 2007	8-883-10

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

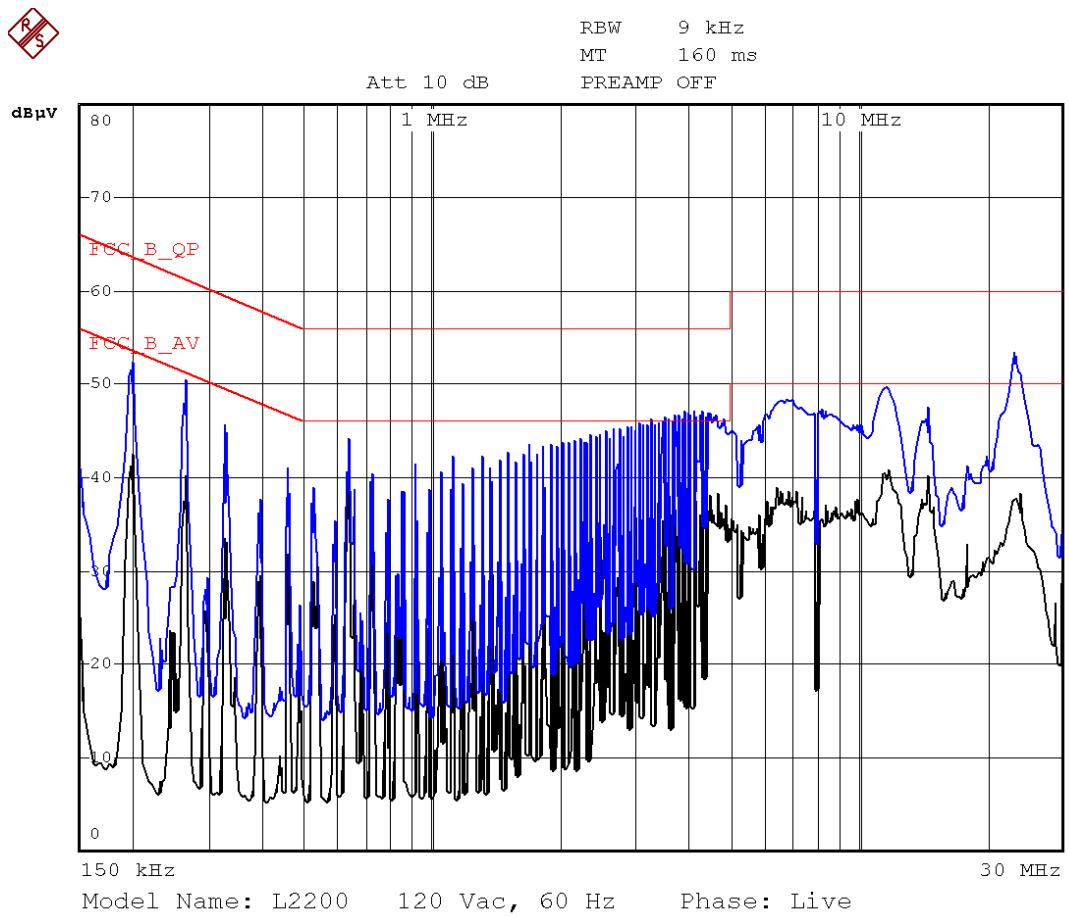
◆ Test Program      See the operation in page 7.

◆ Test Date      April 8, 2008

◆ Test Area      1<sup>st</sup> Shielded Room (for Conducted Emission test)

*Note : The equipment used is calibrated in regular for every year.*

Conducted Emissions

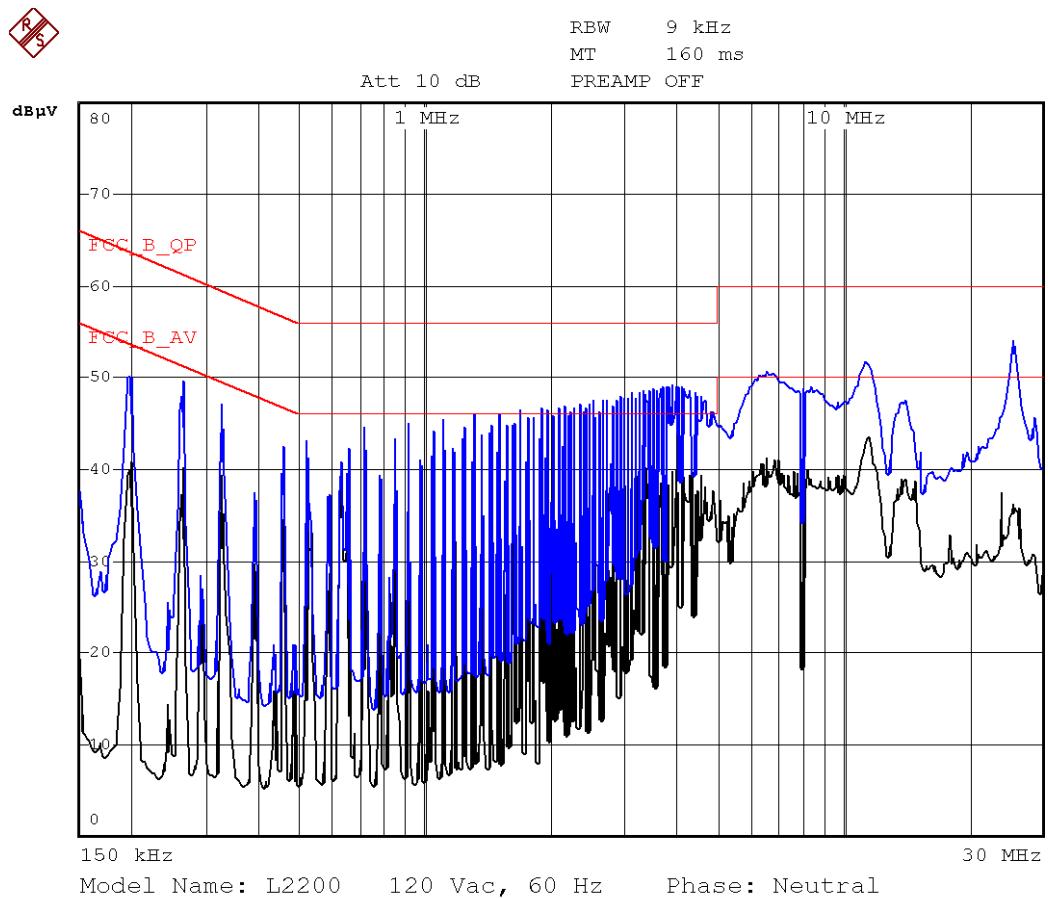


Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss	Cable Loss	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.26	50.51	43.92	61.46	51.46	0.28	0.41	51.20	44.61	10.26	6.85
0.32	47.62	39.63	59.60	49.60	0.24	0.12	47.98	39.99	11.62	9.61
1.95	47.18	37.12	56.00	46.00	0.25	0.78	48.21	38.15	7.79	7.85
3.51	49.51	41.63	56.00	46.00	0.30	0.60	50.41	42.53	5.59	3.47
6.50	51.23	42.06	60.00	50.00	0.36	0.50	52.09	42.92	7.91	7.08
11.24	51.43	43.93	60.00	50.00	0.46	0.27	52.16	44.66	7.84	5.34

Input mode : D-Sub

Note :

Conducted Emissions



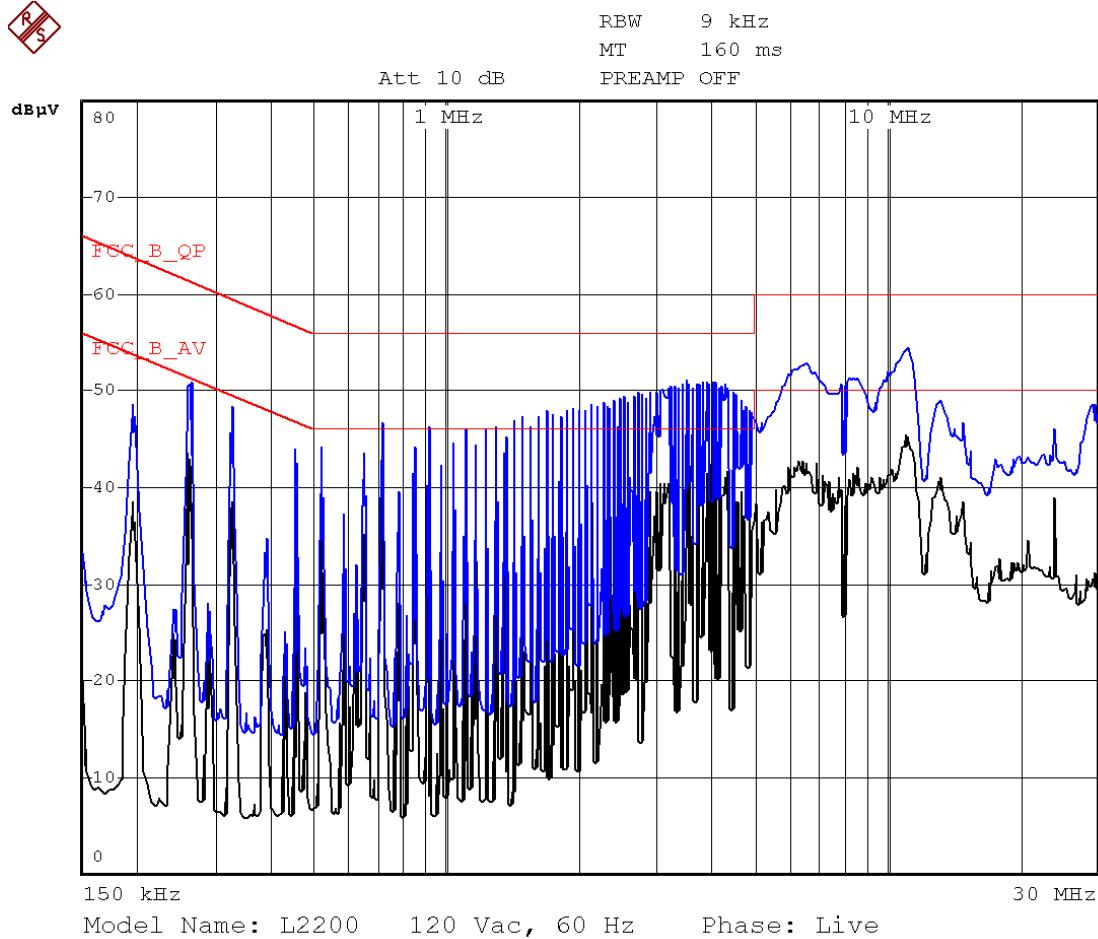
Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss [dB]	Cable Loss [dB $\mu$ V]	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.26	49.29	41.22	61.40	51.40	0.26	0.34	49.89	41.82	11.51	9.58
0.33	47.93	41.06	59.58	49.58	0.25	0.12	48.30	41.43	11.28	8.15
2.99	48.88	41.38	56.00	46.00	0.30	0.60	49.78	42.28	6.22	3.72
3.51	49.78	42.04	56.00	46.00	0.31	0.60	50.69	42.95	5.31	3.05
6.56	51.12	42.78	60.00	50.00	0.36	0.50	51.98	43.64	8.02	6.36
11.63	47.91	40.52	60.00	50.00	0.46	0.23	48.60	41.21	11.40	8.79

Input mode : D-Sub

Note :

Conducted Emissions

R  
S



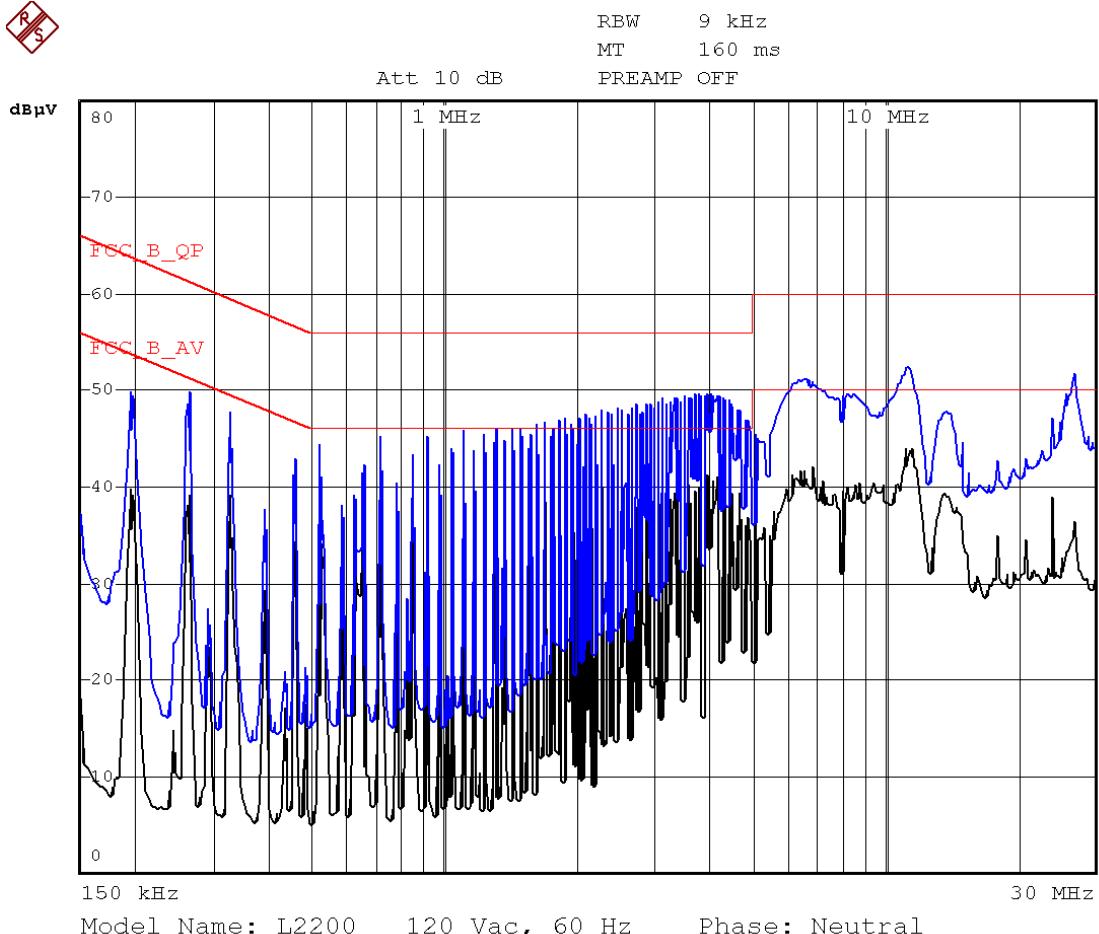
Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss [dB]	Cable Loss [dB $\mu$ V]	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.20	50.42	41.65	63.82	53.82	0.32	0.80	51.54	42.77	12.28	11.05
0.26	49.08	41.01	61.37	51.37	0.27	0.34	49.69	41.62	11.68	9.75
2.55	45.40	36.14	56.00	46.00	0.27	0.68	46.35	37.09	9.65	8.91
4.05	46.56	37.18	56.00	46.00	0.31	0.58	47.45	38.07	8.55	7.93
6.67	48.43	39.64	60.00	50.00	0.36	0.50	49.29	40.50	10.71	9.50
24.63	48.50	36.13	60.00	50.00	0.71	0.40	49.61	37.24	10.39	12.76

*Input mode : DVI*

*Note :*

Conducted Emissions

RS



Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss	Cable Loss	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.20	49.34	40.94	63.82	53.82	0.30	0.80	50.44	42.04	13.38	11.78
0.26	48.58	39.23	61.43	51.43	0.26	0.34	49.18	39.83	12.25	11.60
1.70	45.38	39.12	56.00	46.00	0.26	0.67	46.31	40.05	9.69	5.95
3.78	48.10	40.74	56.00	46.00	0.31	0.60	49.01	41.65	6.99	4.35
6.65	49.92	41.50	60.00	50.00	0.36	0.50	50.78	42.36	9.22	7.64
11.54	49.19	41.74	60.00	50.00	0.46	0.24	49.89	42.44	10.11	7.56

Input mode : DVI

Note :

## TEST CONDITIONS AND DATA

### Radiated Emission

[Applicable]

#### ◆ Test Equipment Used

Name	Type	Manufacturer	Calibration Date	Serial Number
ESCS 30	Test Receiver	Rohde & Schwarz	Aug. 28, 2007	100171
VULB 9160	Antenna	Schwarzbeck	Aug. 10, 2007	3048

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program      See the operation in page 7.

◆ Test Date      April 11, 2008

◆ Test Area      2<sup>nd</sup> Open Area Test Site (3 m)

*Note : The equipment used is calibrated in regular for every year.*

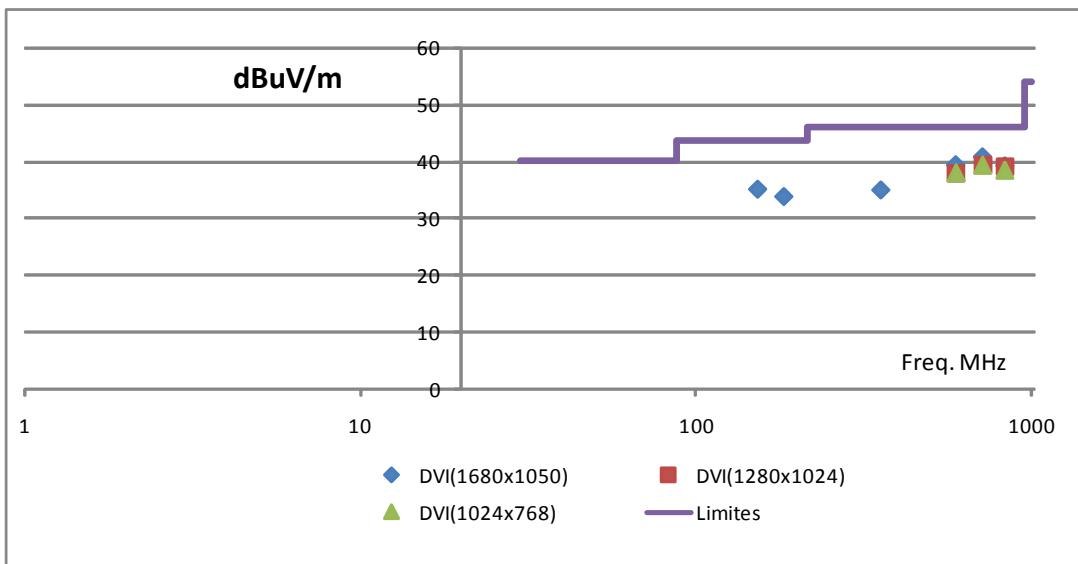
Radiated Emissions

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
1680x1050							
153.19	20.40	13.11	1.73	V	43.50	35.24	8.26
183.26	21.43	10.47	2.04	V	43.50	33.94	9.56
355.92	18.56	13.72	2.82	V	46.00	35.10	10.90
593.56	16.98	18.78	3.77	V	46.00	39.53	6.47
712.87	16.12	20.44	4.35	H	46.00	40.91	5.09
831.12	12.47	22.11	4.76	V	46.00	39.34	6.66
1280x1024							
593.52	15.42	18.78	3.77	V	46.00	37.97	8.03
712.78	14.66	20.44	4.35	H	46.00	39.45	6.55
831.22	12.23	22.11	4.76	V	46.00	39.10	6.90
1024x768							
593.51	15.43	18.78	3.77	V	46.00	37.98	8.02
712.75	14.53	20.44	4.35	H	46.00	39.32	6.68
831.21	11.59	22.11	4.76	V	46.00	38.46	7.54

*Input mode : DVI*

*Note :*

**MEASUREMENT OF DISTURBANCE RADIATION**



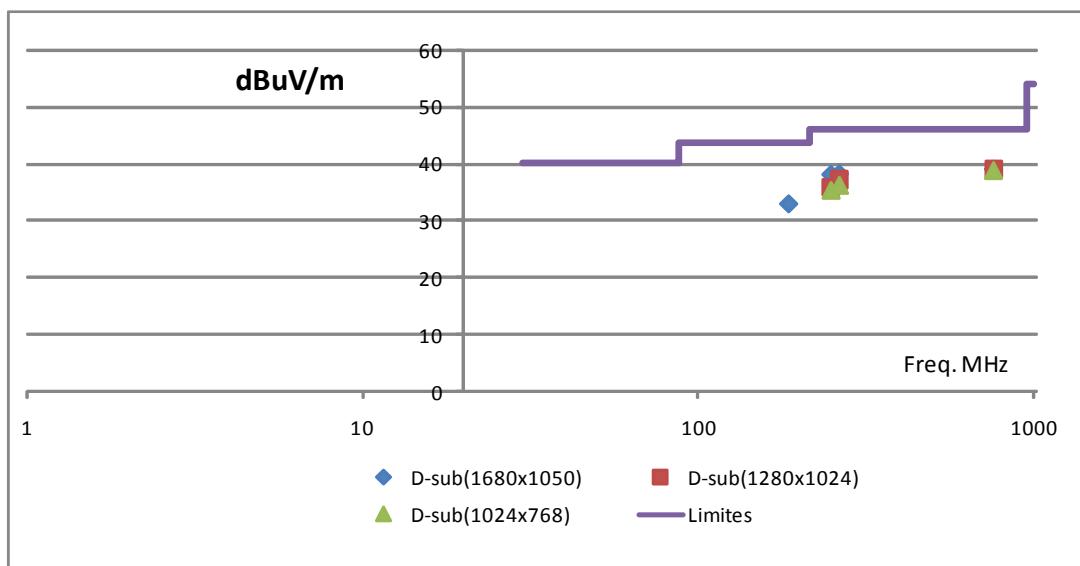
**Radiated Emissions**

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
<b>1680x1050</b>							
185.20	20.56	10.30	2.07	V	43.50	32.93	10.57
247.28	24.92	10.83	2.37	V	46.00	38.12	7.88
261.83	24.51	11.30	2.42	V	46.00	38.23	7.77
751.67	13.12	21.45	4.50	H	46.00	39.07	6.93
<b>1280x1024</b>							
247.25	22.78	10.83	2.37	V	46.00	35.98	10.02
261.83	23.45	11.30	2.42	V	46.00	37.17	8.83
751.66	13.11	21.45	4.50	H	46.00	39.06	6.94
<b>1024x768</b>							
247.27	21.98	10.83	2.37	V	46.00	35.18	10.82
261.88	22.36	11.30	2.42	V	46.00	36.08	9.92
751.65	12.75	21.45	4.50	H	46.00	38.70	7.30

*Input mode : D-Sub*

*Note :*

### MEASUREMENT OF DISTURBANCE RADIATION



**Appendix A. The Photos of Test Setup**



**Conducted Emissions-Front View**



**Conducted Emissions-Rear View**

Appendix A. The Photos of Test Setup



Radiated Emissions(30MHz-1GHz)-Front View



Radiated Emissions(30MHz-1GHz)-Rear View

Appendix B. The Photos of EUT



Front View

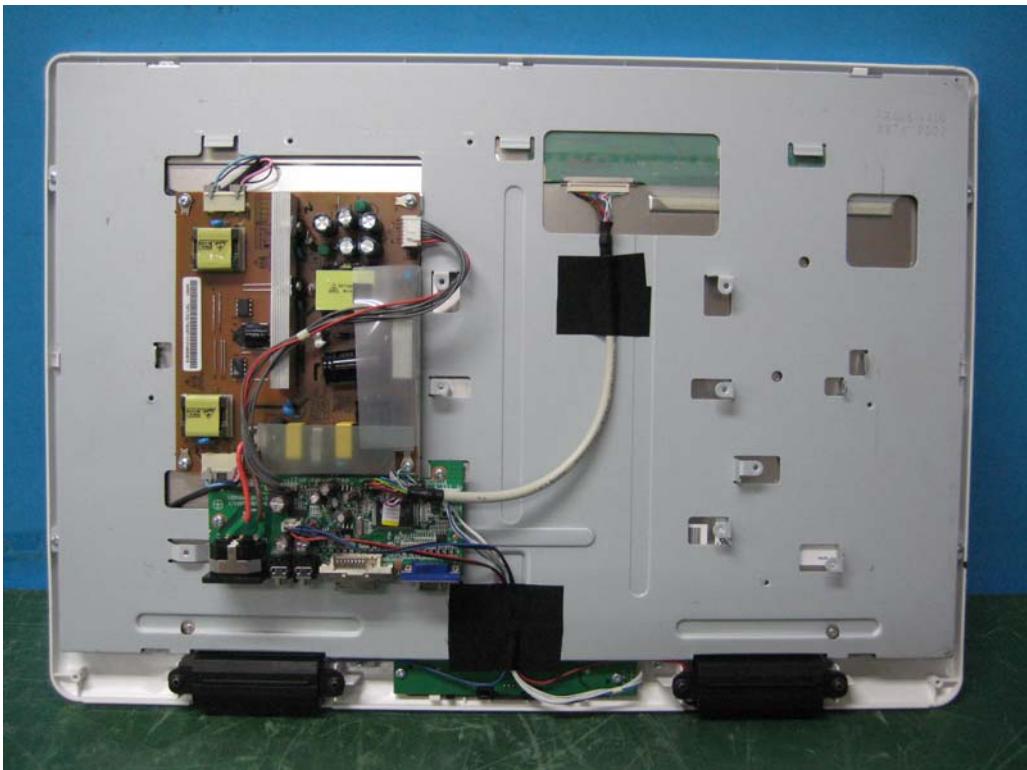


Rear View

Appendix B. The Photos of EUT



Inner View 1



Inner View 2

Appendix B. The Photos of EUT



LCD Label



Audio Cable

Appendix B. The Photos of EUT



D-sub Cable



DVI Cable