

# Certification of Compliance

## CFR 47 Part 15 Subpart B

Test Report File No. : 06-IST-0483

Date of Issue : December 14, 2006

FCC ID : QZFL2200

Model(s) : L2200  Basic  Alternate

Kind of Product : LCD MONITOR

Applicant : DAEWOO Lucoms Co., Ltd.

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

Manufacturer : DAEWOO Lucoms Co., Ltd.

Address : 1201~4 Ace Techno Tower 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



J.H.Lee / 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 29 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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Note:

## INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (**FCC Filing Lab.**)

80, Jeil-Ri, Yangji-Myun, Yongin-City

Kyonggi-Do, 449-860, Korea

TEL : +82 31 333 9018

FAX : +82 31 333 9019

## ENVIRONMENTAL CONDITIONS

Temperature 6.5 °C

Humidity 34 %

Atmospheric pressure 1014 mbar

## POWER SUPPLY SYSTEM USED

Power supply system AC 120V, 60Hz

(Refer to the product information)

## PRODUCT INFORMATION

Panel	Size	22-inch (55.88cm) diagonal
	Pixel Pitch	0.282(H)mm x 0.282(V)mm
	Viewing Angle	160°(Right/Left) 160°(up) 60°(down)
	Brightness	300cd/m <sup>2</sup> brightness (typ)
	Response Time	5msec
	Color Filter	RGB vertical stripe
	Brand	LG.PHILIPS
	Synchronization	Horizontal 30 - 80KHz Vertical 56 - 77 Hz
Video Bandwidth		165MHz
Max Resolution		1680 x 1050@ 60Hz
Optimal Resolution		1680 x 1050 @ 60Hz
Colors		16.7 M Colors
Display Area		473.76(H)mm x 296.1(V)mm
AC/DC Adaptor	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
	Model Name	: LI SHIN INTERNATIONAL ENTERPRISE CORP. / China
	Input	: 100~240V ,50~60 Hz 1.5A
	Output	: 12V 5A
Power Consumption		40 W
Dimension-W x H x D	With Stand	523(W) x 405(H) x 156(D) mm
	Without Stand	523(W) x 367(H) x 66(D) mm
Weight-net/gross		6.5Kg / 8.7Kg (14.3 lbs/19.2 lbs)
Operating Temperature		10 ~ 40°C /50 ~ 104°F

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

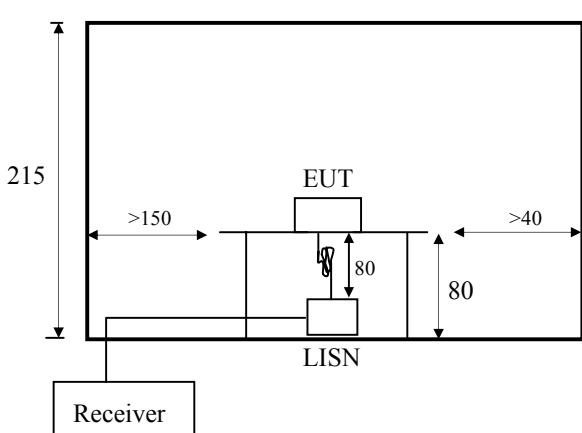
## DESCRIPTIONS OF TEST

### Conducted Emissions:

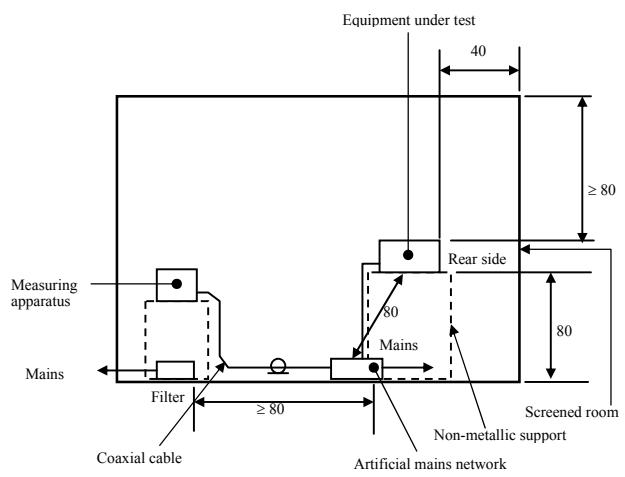
The measurement were performed over the frequency range of 0.15 MHz to 30 MHz using a ESH2-Z5 LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10 KHz or for "quasi-peak" & "Average" 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 1.5m away from the other wall of the shielded room. The ESCS30 and ESH2-Z5 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 ESH2-Z5 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 ESH2-Z5 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 ESCS30 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 >

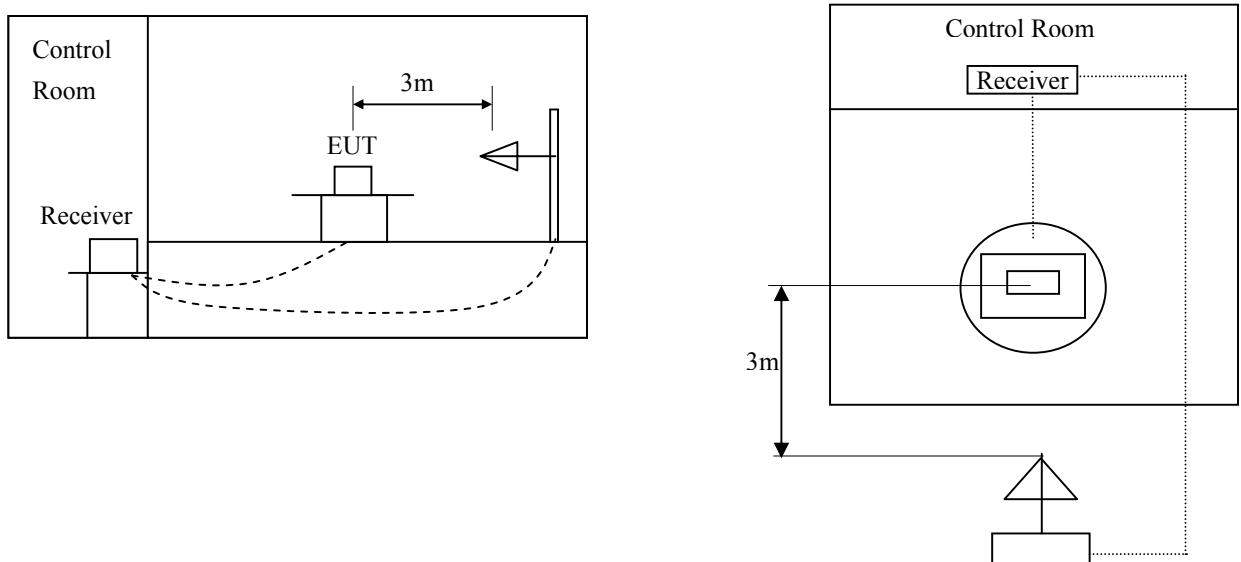
## DESCRIPTION OF TEST

### Radiated Emissions:

The measurement was performed over the frequency range of 30MHz 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

### Configuration of the equipment under test :

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

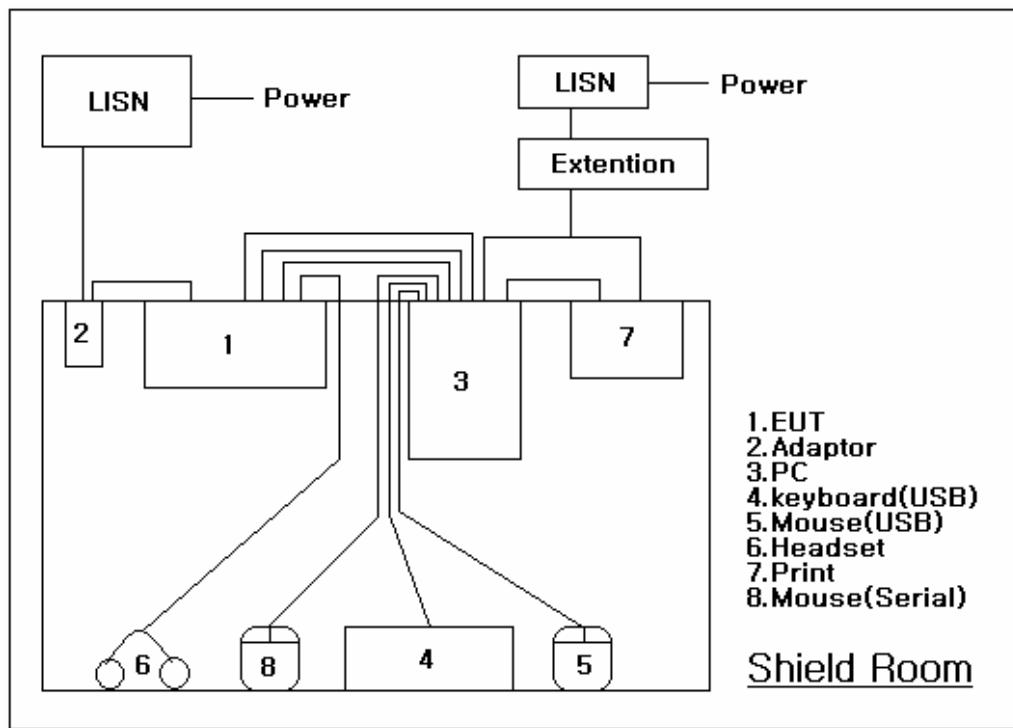
Equipment	Type	Brand	Serial No.	FCC Compliance Info.
PC	dx7200 MT	HP	CNG60809T0	DOC
Keyboard(USB)	SK-2885	HP	N/A	DOC
Mouse(USB)	M-UV96	HP	N/A	DOC
Headset	AN-2005	Aion Korea	N/A	-
Mouse(Serial)	M-M28	Logitech	N/A	DZL210365
Printer	A0302380	Northern Telecom	2516S60951	BS46XU225C-L

### Connecting Interface Cables :

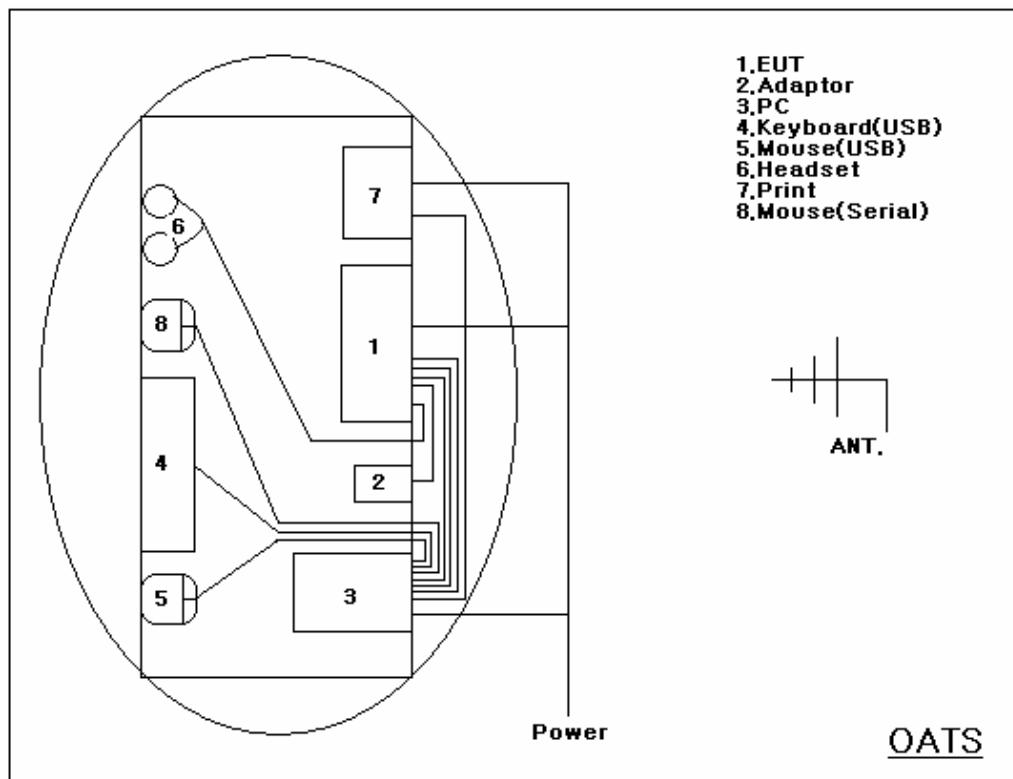
- Unshielded AC power cable : 1.8 m
- Shielded monitor signal(D-sub) cable (with two ferrite core) : 1.6 m.
- Shielded monitor signal(DVI) cable (with two ferrite core) : 1.6 m
- Unshielded keyboard(USB) signal cable (without ferrite core) : 1.8 m
- Unshielded mouse(USB) signal cable (without ferrite core) : 1.8 m
- Unshielded mouse(Serial) signal cable (without ferrite core) : 1.6 m
- Unshielded printer(Parallel) signal cable (without ferrite core) : 1.8 m
- Unshielded headset 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  MET  Not MET  
Maximum limit exceeding

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

Find the test data in following pages 11 to 12.

#### ■ Radiated Emission

The requirements are  
Minimum limit margin  MET  Not MET  
Maximum limit exceeding

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

Find the D-SUB test data in following page 14 to 19.

Find the DVI test data in following page 20 to 25.

Test Resolution Input mode: D-Sub (1680\*1050, 60 Hz)

### test Date

Begin of testing : Dec. 11, 2006

End of testing : Dec. 12, 2006

Prepared By

Note :

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



S.J.OH / EMC Engineer

## TEST CONDITIONS AND DATA

### Conducted Emissions

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Calibration Date	Serial Number
ESCS 30	Test Receiver	Rohde & Schwarz	Aug. 17, 2006	100171
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	May 22, 2006	357.8810.52
ESH2-Z5	LISN	Rohde & Schwarz	May 22, 2006	842966/007

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

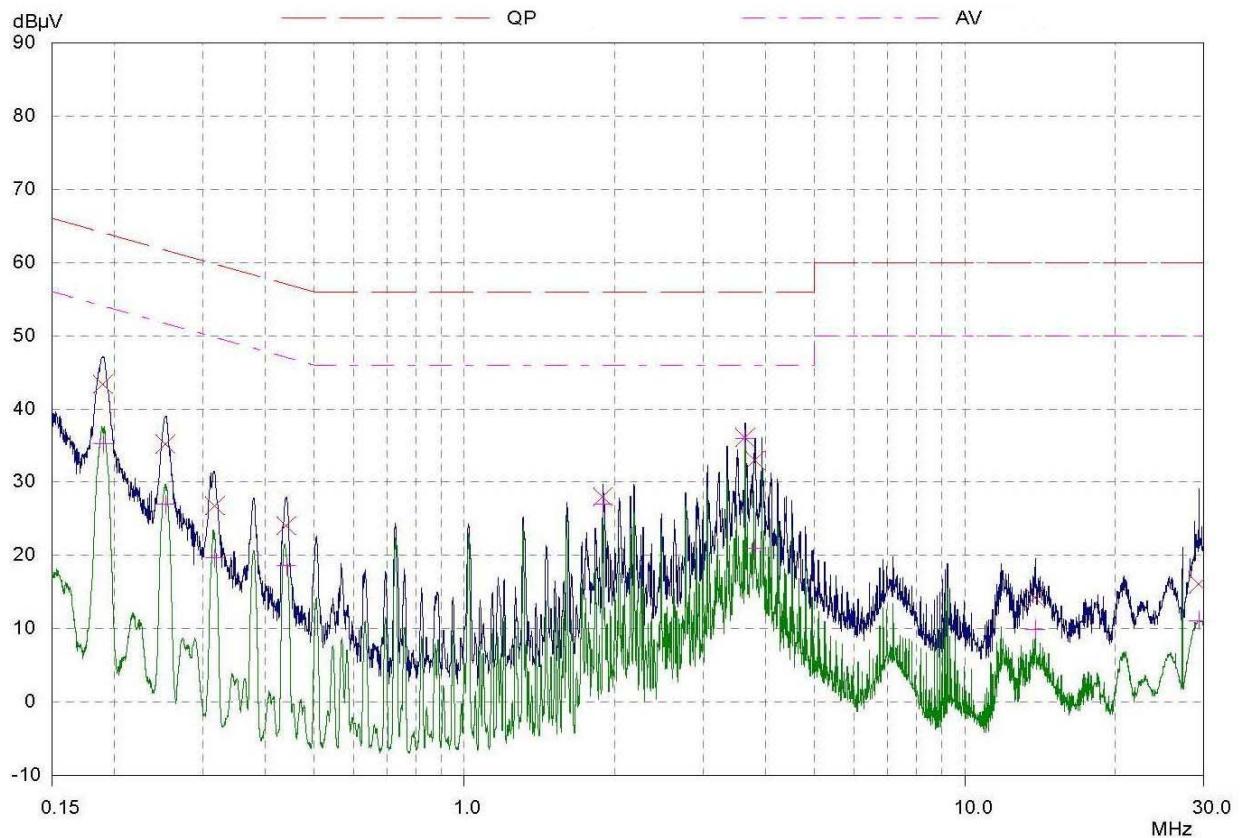
◆ Test Program      See the operation in page 7.

◆ Test Date      Dec. 11, 2006

◆ Test Area      Shielded Room (for Conducted Emission test)

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

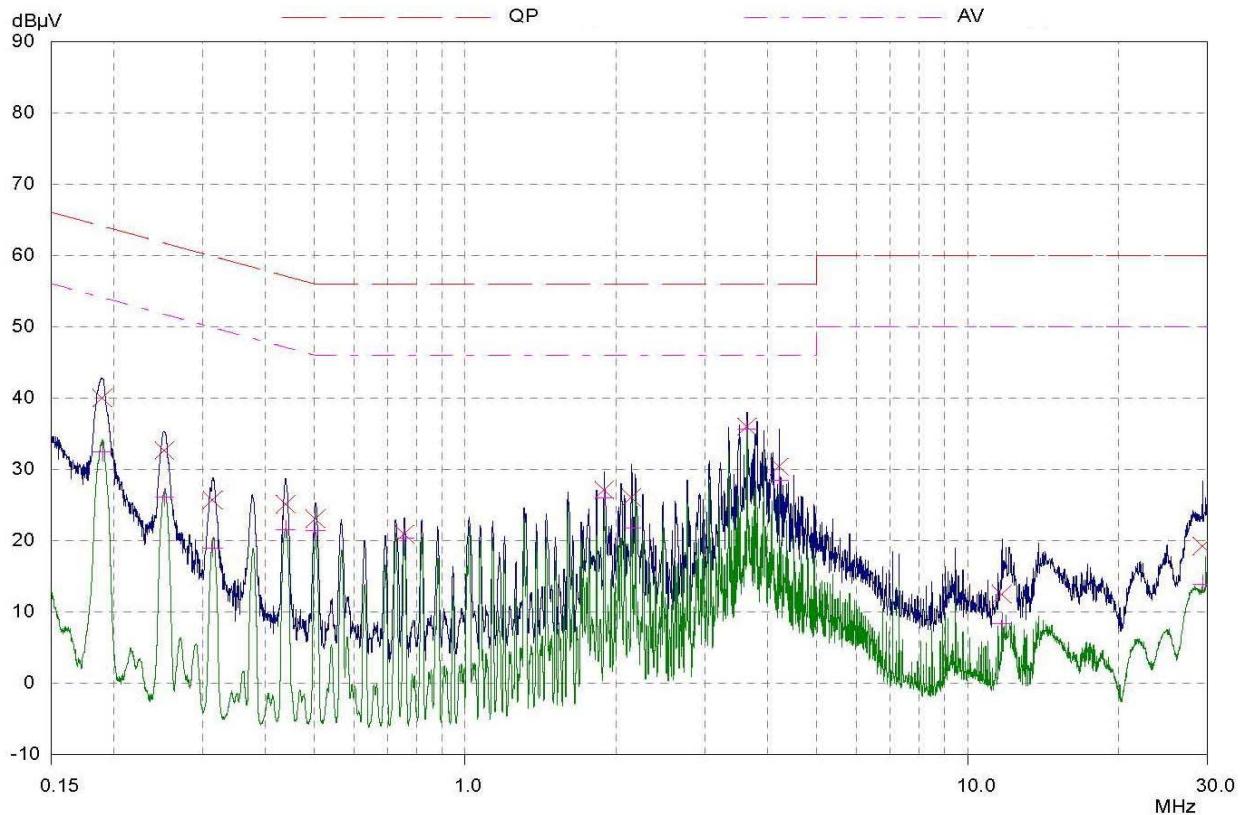
**Conducted Emissions**



Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss [dB]	Cable Loss [dB $\mu$ V]	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.19	43.38	35.08	64.04	54.04	0.33	0.80	44.51	36.21	19.53	17.83
0.25	35.11	26.87	61.65	51.65	0.28	0.41	35.80	27.56	25.85	24.09
0.32	26.69	19.56	59.78	49.78	0.25	0.11	27.05	19.92	32.73	29.86
0.44	23.95	18.49	57.04	47.04	0.20	0.20	24.35	18.89	32.69	28.15
1.89	27.92	26.87	56.00	46.00	0.25	0.75	28.92	27.87	27.08	18.13
3.64	35.96	35.80	56.00	46.00	0.30	0.60	36.86	36.70	19.14	9.30
3.81	32.86	20.86	56.00	46.00	0.30	0.60	33.76	21.76	22.24	24.24
13.82	14.15	9.90	60.00	50.00	0.52	0.41	15.08	10.83	44.92	39.17
29.36	16.01	11.04	60.00	50.00	0.74	0.46	17.21	12.24	42.79	37.76

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
0.19	39.97	32.37	64.04	54.04	0.32	0.80	41.09	33.49	22.95	20.55
0.25	32.59	26.05	61.69	51.69	0.27	0.41	33.27	26.73	28.42	24.96
0.31	25.65	18.93	59.84	49.84	0.25	0.11	26.01	19.29	33.83	30.55
0.44	25.10	21.52	57.07	47.07	0.23	0.20	25.53	21.95	31.54	25.12
0.50	23.03	21.30	56.00	46.00	0.22	0.20	23.45	21.72	32.55	24.28
0.76	20.85	20.32	56.00	46.00	0.23	0.25	21.33	20.80	34.67	25.20
1.89	27.10	25.99	56.00	46.00	0.26	0.75	28.11	27.00	27.89	19.00
2.14	25.99	21.74	56.00	46.00	0.27	0.76	27.02	22.77	28.98	23.23
3.64	35.94	35.58	56.00	46.00	0.31	0.60	36.85	36.49	19.15	9.51
4.22	30.31	28.48	56.00	46.00	0.32	0.53	31.16	29.33	24.84	16.67
11.71	12.44	8.35	60.00	50.00	0.47	0.22	13.13	9.04	46.87	40.96
29.36	19.20	13.88	60.00	50.00	0.73	0.46	20.39	15.07	39.61	34.93

Note :

## TEST CONDITIONS AND DATA

### Radiated Emission

[Applicable]

#### ◆ Test Equipment Used

Name	Type	Manufacturer	Calibration Date	Serial Number
ESCS 30	Test Receiver	Rohde & Schwarz	Jan. 16, 2006	828985/023
VULB 9160	Antenna	Schwarzbeck	Aug. 14, 2006	3047

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program      See the operation in page 7.

◆ Test Date      Dec. 12, 2006

◆ Test Area      Open Area Test Site No.1

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

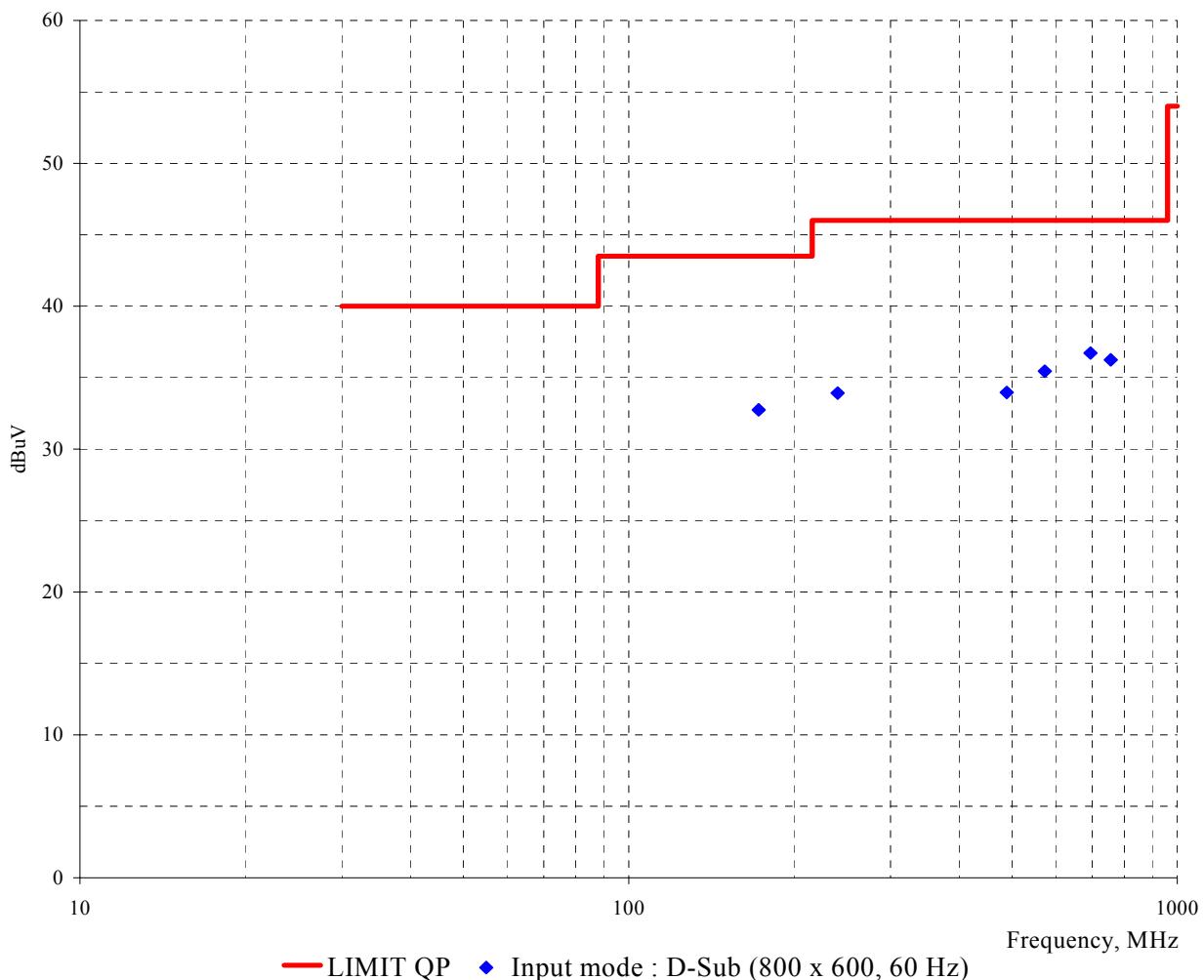
Radiated Emissions

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
172.56	18.50	11.73	2.52	H	43.50	32.75	10.75
240.32	20.30	10.58	3.04	H	46.00	33.92	12.08
488.81	12.50	16.89	4.57	H	46.00	33.96	12.04
573.19	11.60	18.52	5.33	V	46.00	35.45	10.55
694.44	10.80	19.98	5.95	V	46.00	36.73	9.27
756.52	8.40	21.62	6.22	V	46.00	36.24	9.76

*Note:*

*Input mode : D-Sub (800 x 600,60 Hz)*

### MEASUREMENT OF DISTURBANCE RADIATION



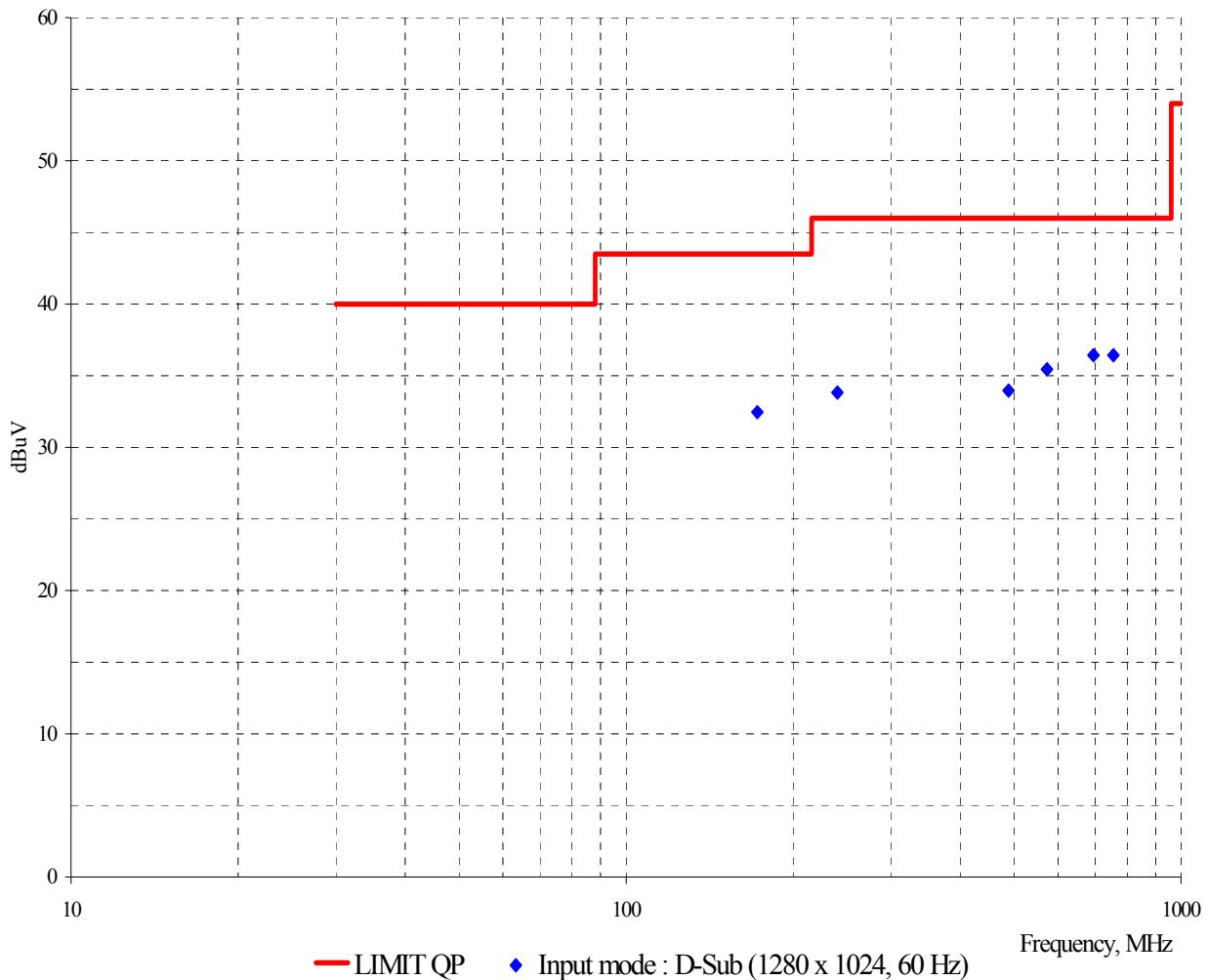
**Radiated Emissions**

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
172.44	18.20	11.74	2.52	H	43.50	32.46	11.04
240.38	20.20	10.58	3.04	H	46.00	33.82	12.18
488.77	12.50	16.89	4.57	H	46.00	33.96	12.04
573.25	11.60	18.52	5.33	V	46.00	35.45	10.55
695.38	10.50	19.98	5.96	V	46.00	36.44	9.56
755.64	8.60	21.62	6.22	V	46.00	36.44	9.56

*Note :*

*Input mode : D-Sub (1280 x 1024, 60 Hz)*

### MEASUREMENT OF DISTURBANCE RADIATION



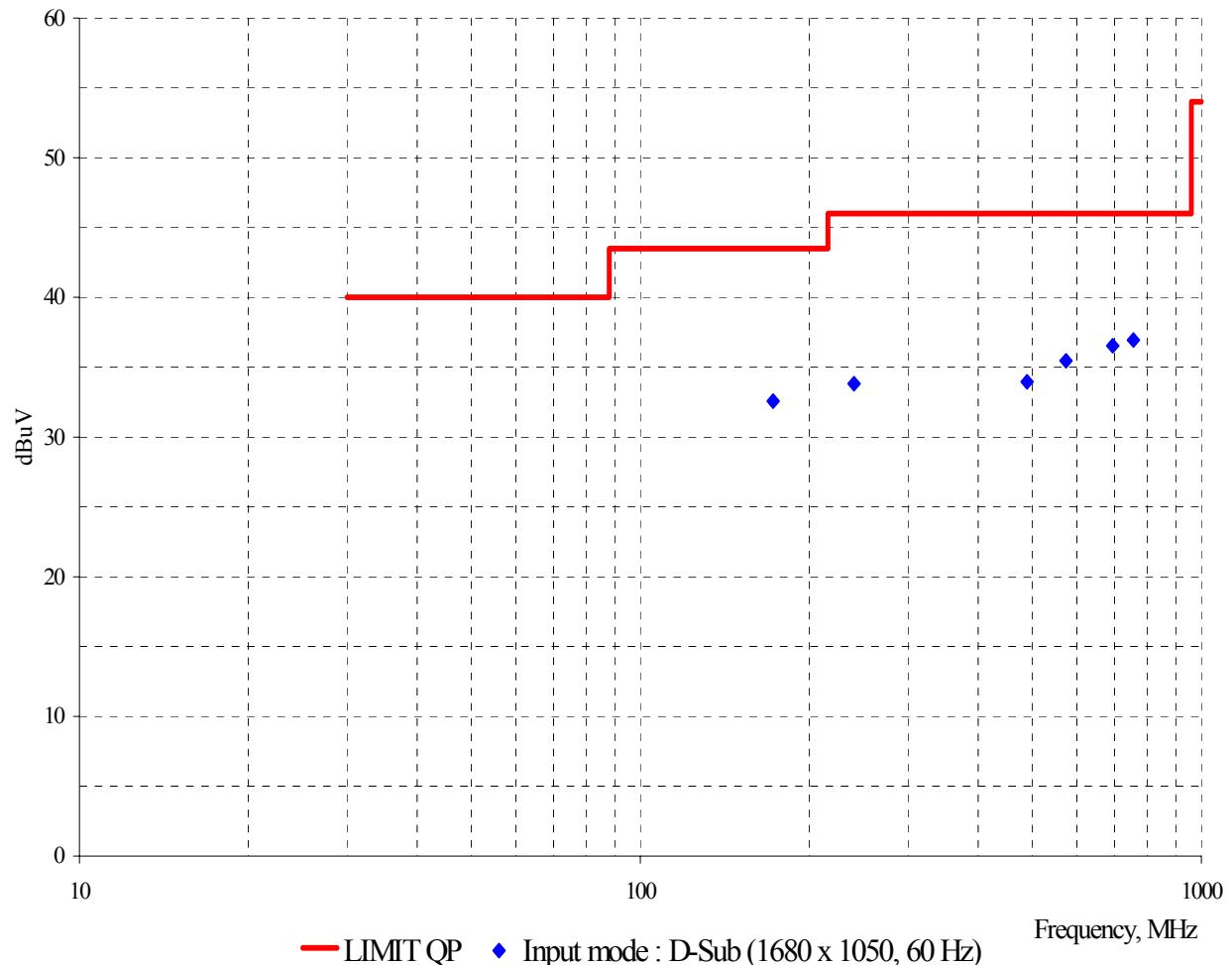
**Radiated Emissions**

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
172.35	18.30	11.75	2.52	H	43.50	32.57	10.93
240.32	20.20	10.58	3.04	H	46.00	33.82	12.18
488.81	12.50	16.89	4.57	H	46.00	33.96	12.04
573.77	11.60	18.52	5.34	V	46.00	35.46	10.54
694.87	10.60	19.98	5.95	V	46.00	36.53	9.47
756.28	9.10	21.62	6.22	V	46.00	36.94	9.06

*Note :*

*Input mode : D-Sub (1680 x 1050, 60 Hz)*

## MEASUREMENT OF DISTURBANCE RADIATION



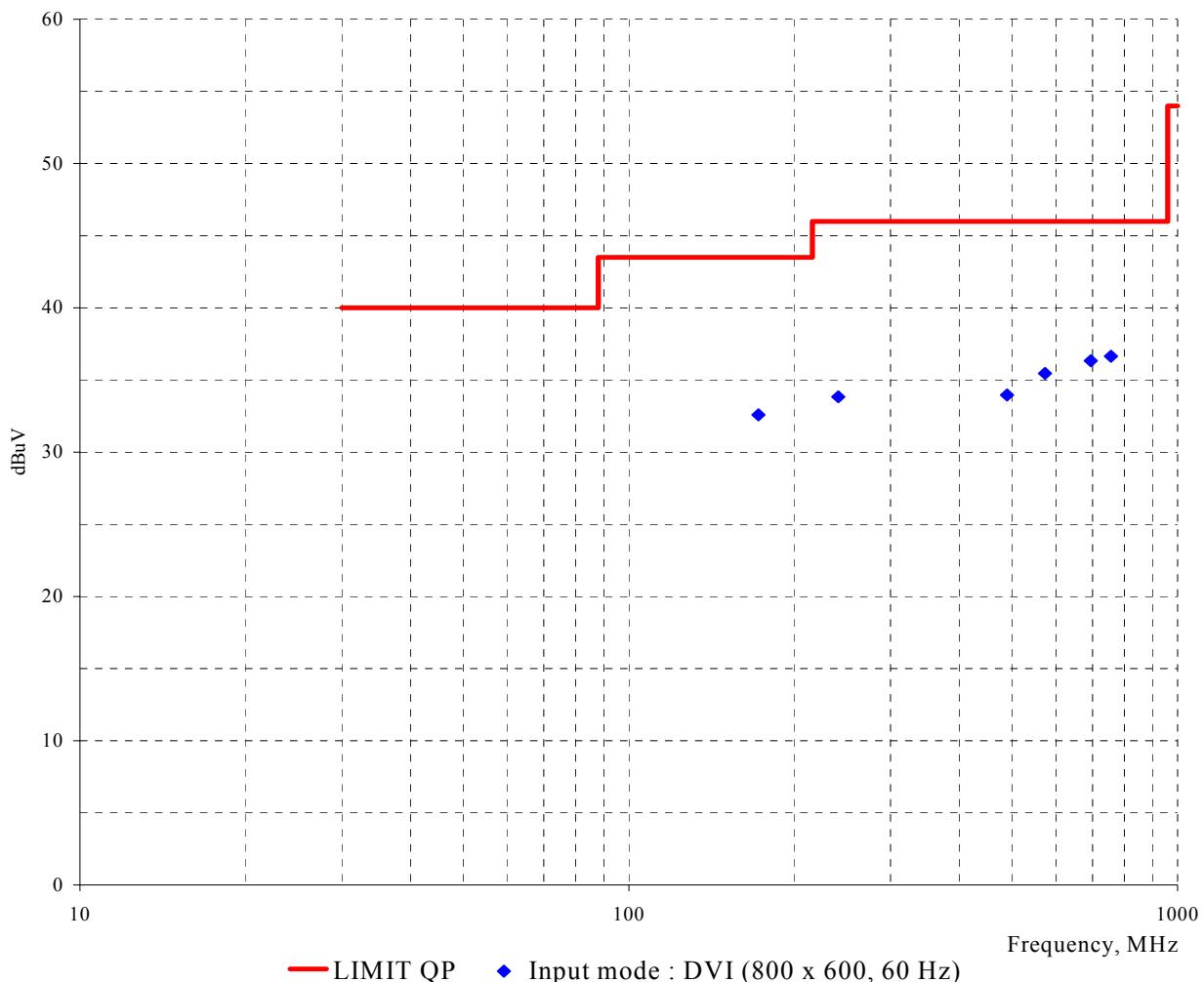
Radiated Emissions

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
172.28	18.30	11.76	2.52	H	43.50	32.58	10.92
240.88	20.20	10.60	3.04	H	46.00	33.84	12.16
488.76	12.50	16.89	4.57	H	46.00	33.96	12.04
573.48	11.60	18.52	5.34	V	46.00	35.46	10.54
694.56	10.40	19.98	5.95	V	46.00	36.33	9.67
756.38	8.80	21.62	6.22	V	46.00	36.64	9.36

*Note :*

*Input mode : DVI (800 x 600, 60 Hz)*

### MEASUREMENT OF DISTURBANCE RADIATION



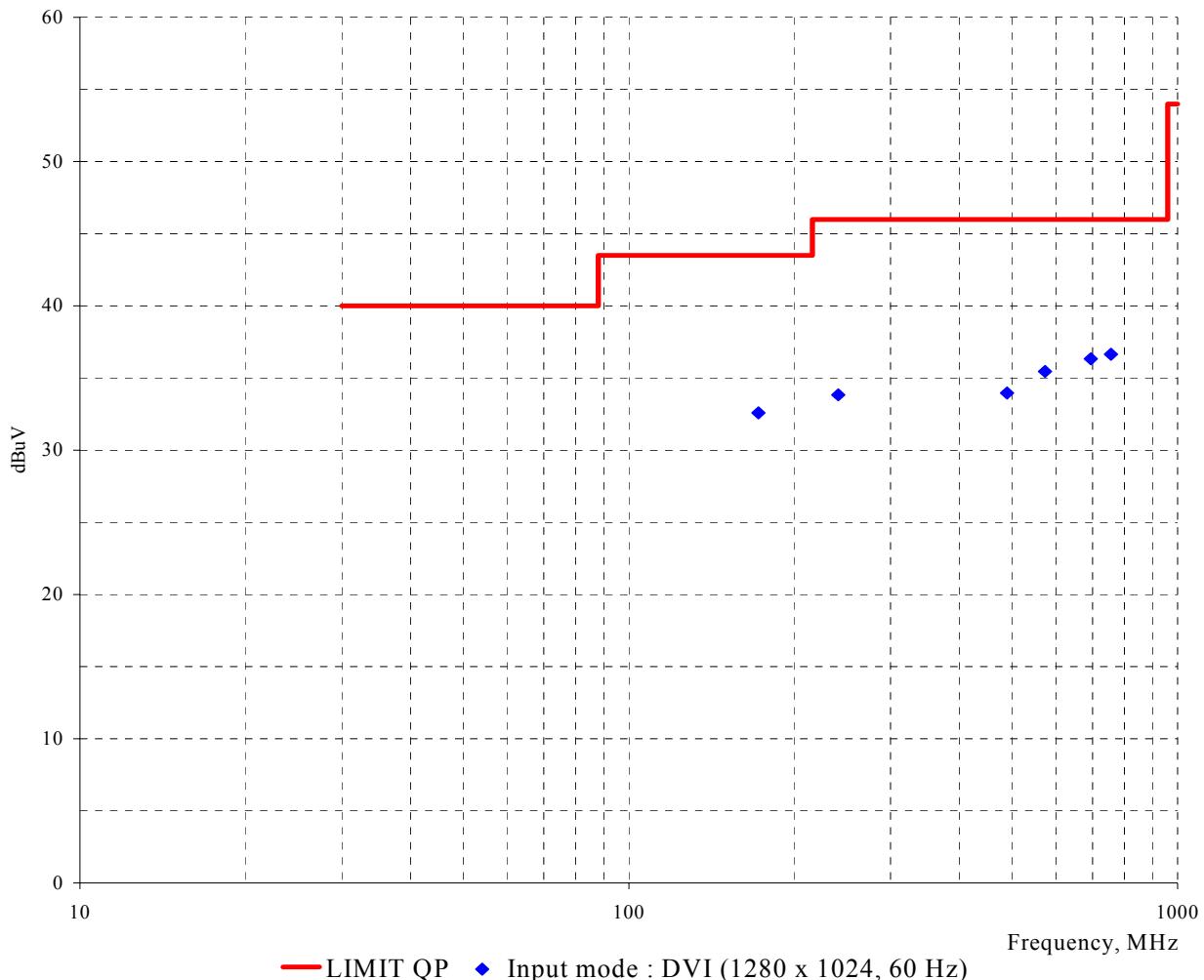
**Radiated Emissions**

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
172.44	18.30	11.74	2.52	H	43.50	32.56	10.94
240.28	20.20	10.58	3.04	H	46.00	33.82	12.18
488.35	12.50	16.88	4.57	H	46.00	33.95	12.05
573.29	11.60	18.52	5.33	V	46.00	35.45	10.55
694.72	10.10	19.98	5.95	V	46.00	36.03	9.97
756.38	8.60	21.62	6.22	V	46.00	36.44	9.56

*Note :*

*Input mode : DVI (1280 x 1024, 60 Hz)*

## MEASUREMENT OF DISTURBANCE RADIATION



**Radiated Emissions**

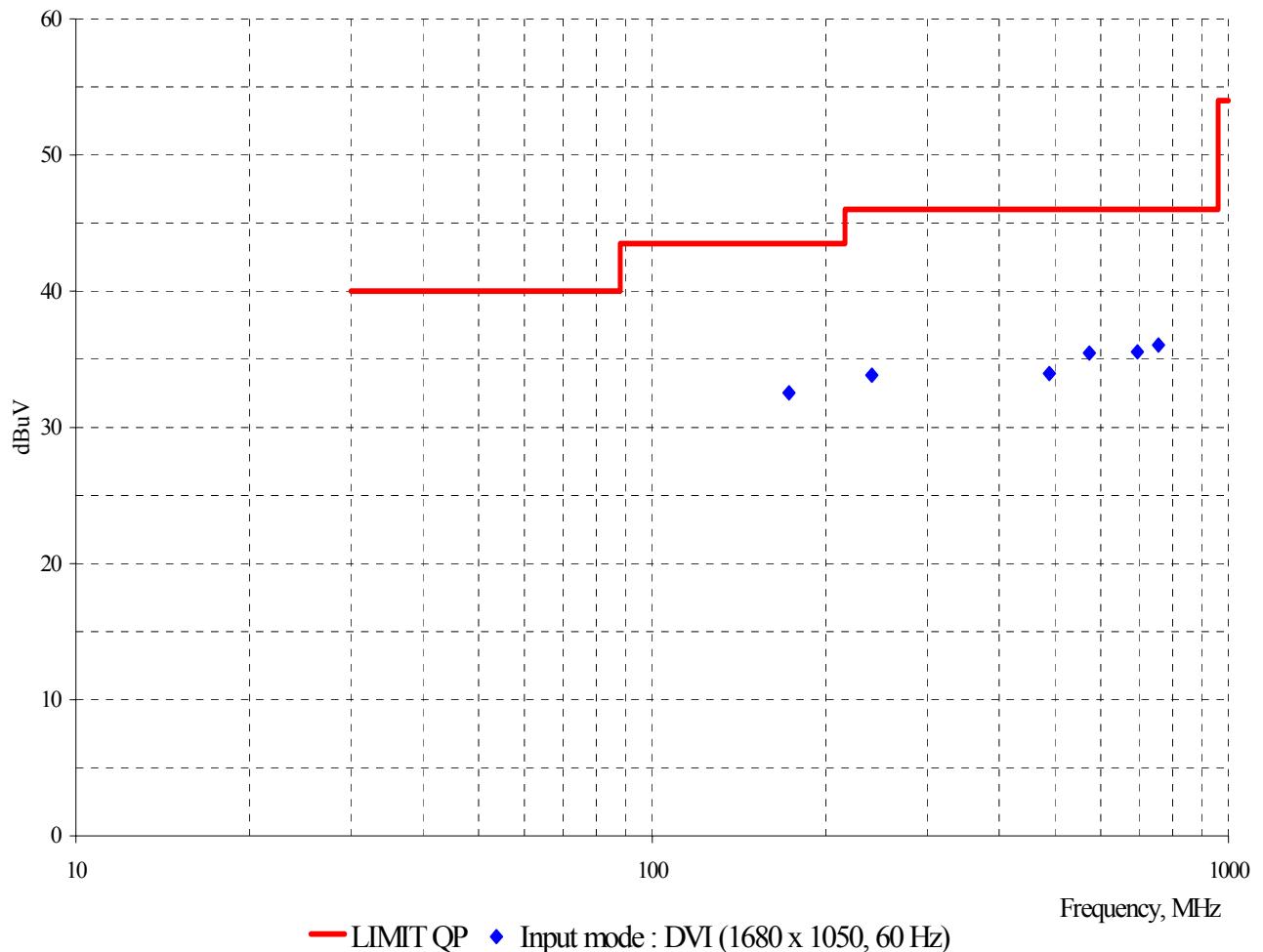
Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
172.65	18.30	11.71	2.52	H	43.50	32.53	10.97
240.48	20.20	10.59	3.04	H	46.00	33.83	12.17
488.88	12.50	16.89	4.57	H	46.00	33.96	12.04
573.59	11.60	18.52	5.34	V	46.00	35.46	10.54
695.44	9.60	19.98	5.96	V	46.00	35.54	10.46
756.19	8.2	21.62	6.22	V	46.00	36.04	9.96

*Note :*

*Input mode : DVI (1680 x 1050, 60 Hz)*

*End of Data*

## MEASUREMENT OF DISTURBANCE RADIATION



Appendix A. The Photos of Test Setup

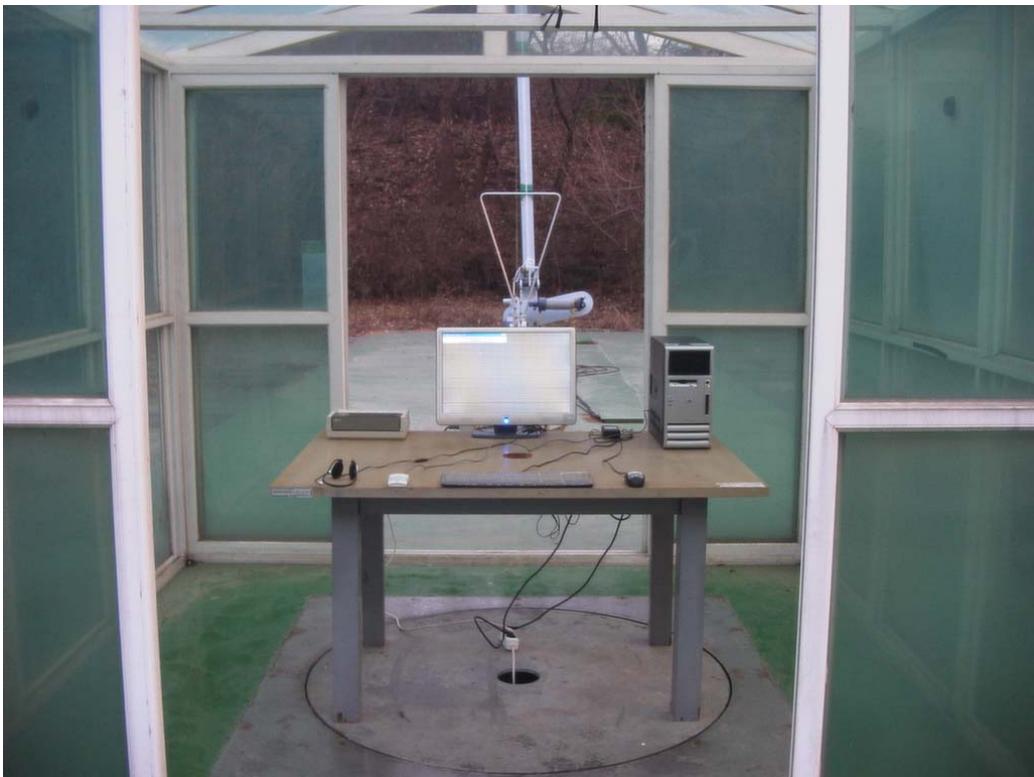


Conducted Emissions-Front View



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



Adaptor



Label