

# Certification of Compliance

## CFR 47 Part 15 Subpart B

Test Report File No. : 04-IST-0256 Date of Issue : September 22, 2004  
Model(s) : DLN-20D3AHS  
DLN-20D3 (Buyer Model)  
Kind of Product : 20" LCD Monitor  
Applicant : Daewoo Electronics Corp.  
Address : 543, Dangjung-Dong, Kunpo-City, Gyeonggi-Do, Korea  
Manufacturer : Daewoo Electronics Corp.  
Address : 295 Kongdan-dong, Kumi-City, Kyongsangbuk-Do, Korea  
Daewoo Electronics Manufacturing Poland SP.ZO.O.  
05-800 Ruszkow, UL. Parnziewska 18, Poland  
Daewoo Electronics United Kingdom LTD.  
Rathernraw industrial Estate 62/82 Greystone Road Antrim  
BT41 1NU, Northern Ireland UK  
Daewoo Electronics Mexico, S. A. De C. V.  
Samuel Occana Garcia Esq. Con Revolucion, Parque Industrial,  
San Luis Rio Colorado, Sonora, Mexico

### Test Result

Positive

Negative

Reviewed By



J. H. Lee / EMC Group Manager

Approved By



G. Chung / Chief

- Investigations requested : Measurement to the relevant clauses of F.C.C rules and regulations Part 15 Subpart B (Unintentional Radiators, Class B) - Class B PC Peripherals
- The 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 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 2001.



## TABLE OF CONTENTS

Table of contents	2	
Test Regulations		
Information of test laboratory		
Environmental condition		
Measurement Uncertainty	3	
Power used		
Product Information	4	
Description of test		
Conducted Emission	5	
Radiated Emission	6	
Equipment Under Test	7	
Summary	8	
Test conditions and data		
Conducted emissions	0.15 MHz – 30 MHz	Applicable
Test equipment		9
Data and plots		10-11
Radiated emissions	30 MHz – 1 GHz	Applicable
Test equipment		12
Data and plots		13
Appendix		
A. The EUT Photos	14-15	
B. The Test Setup Photos	16-17	

## TEST REGULATIONS

The tests were performed according to the following regulations ;

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

## INFORMATIONS OF TEST LABORATORY

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

San 21-8, Goan-Ri, Baekam-Myun, Yongin-City

Kyonggi-Do, 449-860, Korea

TEL : +82 31 333 4093

FAX : +82 31 333 4094

## ENVIRONMENTAL CONDITIONS

Temperature 23 °C

Humidity 50 %

Atmospheric pressure 1004 mbar

## MEASUREMENT UNCERTAINTY

The measurement uncertainty was evaluated for all test items listed in this report. Also it, " The evaluation and treatment of uncertainty ", is described in IST Quality Manual according to ISO17025 Guide. The data and results described in this report are true and include evaluated uncertainty. It may cause some deviation of uncertainty by change component or process of the test for similar products.

## POWER SUPPLY SYSTEM USED

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

## PRODUCT INFORMATION

Power Requirement AC 100V-240V~, 50/60Hz

Power Consumption 50W

Appearance (mm) 608x456x215

Weight 11Kg

Screen Size 510.54mm

Aspect Ratio 4:3

Number of Pixels 800x600

Display Color 16.7M 8bit

Pixel Pitch 0.51 (H) x 0.51 (V)

Applied LCD Panel A201SN01 (AU Optronics Corp.)

- EMC suppression device is not used during the test.

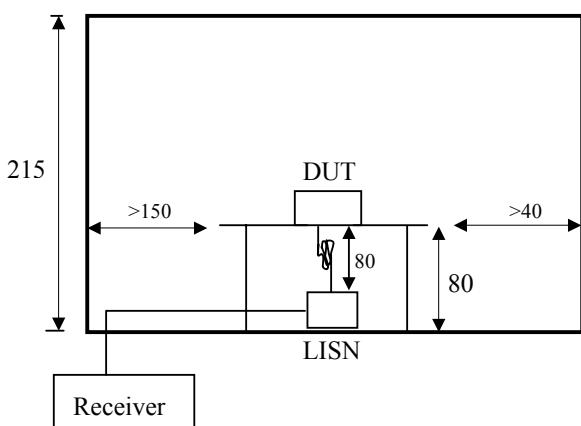
## DESCRIPTIONS OF TEST

### Conducted Emissions:

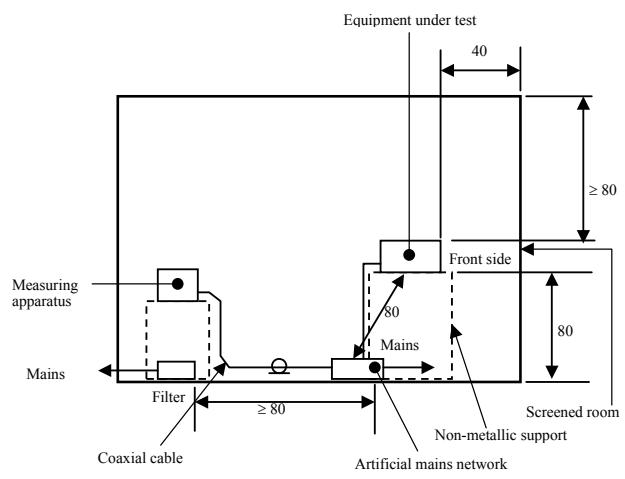
The measurement were performed over the frequency range of 0.15MHz to 30MHz using a  $50\Omega/50\mu\text{H}$  LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" within a bandwidth of 9KHz.

#### -Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1m X 1.5m wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The R/S ESH3-Z5 and EMCO 3825/2 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 EMCO 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  $\phi$  1.2cm. 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 EMCO 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 R/S 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 30MHz. The bandwidth of the receiver was set to 10kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



< Side View >



< Concept Drawing >

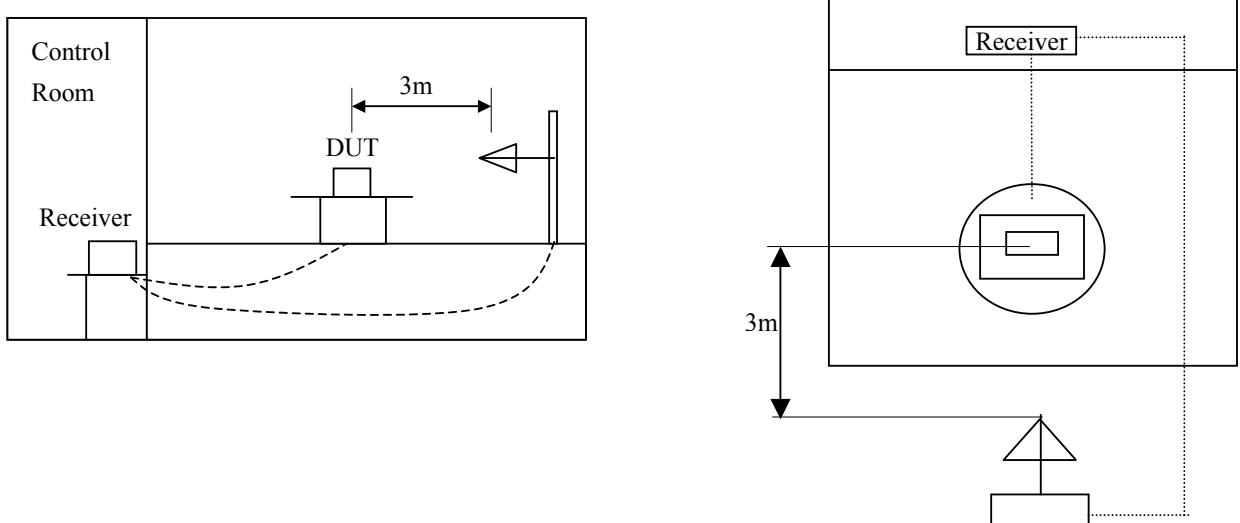
## DESCRIPTION OF TEST

### 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 120KHz.

#### -Procedure of Test

Preliminary measurements were made at 3 meter using bi-conical and log-periodic 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 30MHz to 300MHz using S/B bi-conical antenna and 300 to 1000MHz using S/B log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using S/B 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 120kHz 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.



## 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 :

- Operational Condition : 800x600, 72Hz  
640x480, 72Hz

The test results of followings are the representative of worst case emissions for the available resolution can be adjusted

**Configuration of the equipment under test :**

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

Equipment	Type	Brand	Serial No.
PC	Vectra VL420 MT	HP	SG23101769
Keyboard	SK-2502C	HP	M020321663
PS/2 Mouse	M-S48a	HP	LAC20603927
Printer	A0302384	Northern Telecom	26633S60168
Serial Mouse	M-M28	Logitech	LCA53305547

**Connecting Interface Cables :**

- Unshielded AC power cable : 1.8 m
- Shielded monitor's signal cable (with two ferrite core) : 1.8 m
- Shielded Printer's signal cable (with one ferrite core) : 1.8 m

*Note :*

## SUMMARY

### Emissions

#### ■ Conducted Emission

The requirements are (●) MET ( ) Not MET

Minimum limit margin 16.2 dB 0.247 MHz

Maximum limit exceeding

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

#### **With Live phase**

Find the test data in following pages 10 to 11

#### ■ Radiated Emission

The requirements are (●) MET ( ) Not MET

Minimum limit margin 3.1 dB 139.8 MHz

Maximum limit exceeding

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

#### **Operational Condition : 640 x 480, 72Hz Mode**

Find the test data in following page 13

### Test Date

Begin of Testing : September 15, 2004.

End of Testing : September 16, 2004.

Prepared By

Note :

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

  
I.Y.Lee / Research Engineer

## TEST CONDITIONS AND DATA

### Conducted Emissions

[Applicable]

#### ◆ Test Equipment Used

Model Name	Description	Manufacture	Calibration Date	Serial Number
ESH 3	Test Receiver	Rohde & Schwarz	Jul. 15, 2004	892108/018
3725/2	LISN	EMCO	Jul. 15, 2004	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 15, 2004	8-883-10
ESH 3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 15, 2004	357.8810.52

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program      Scrolling "H" Patterns on the windows

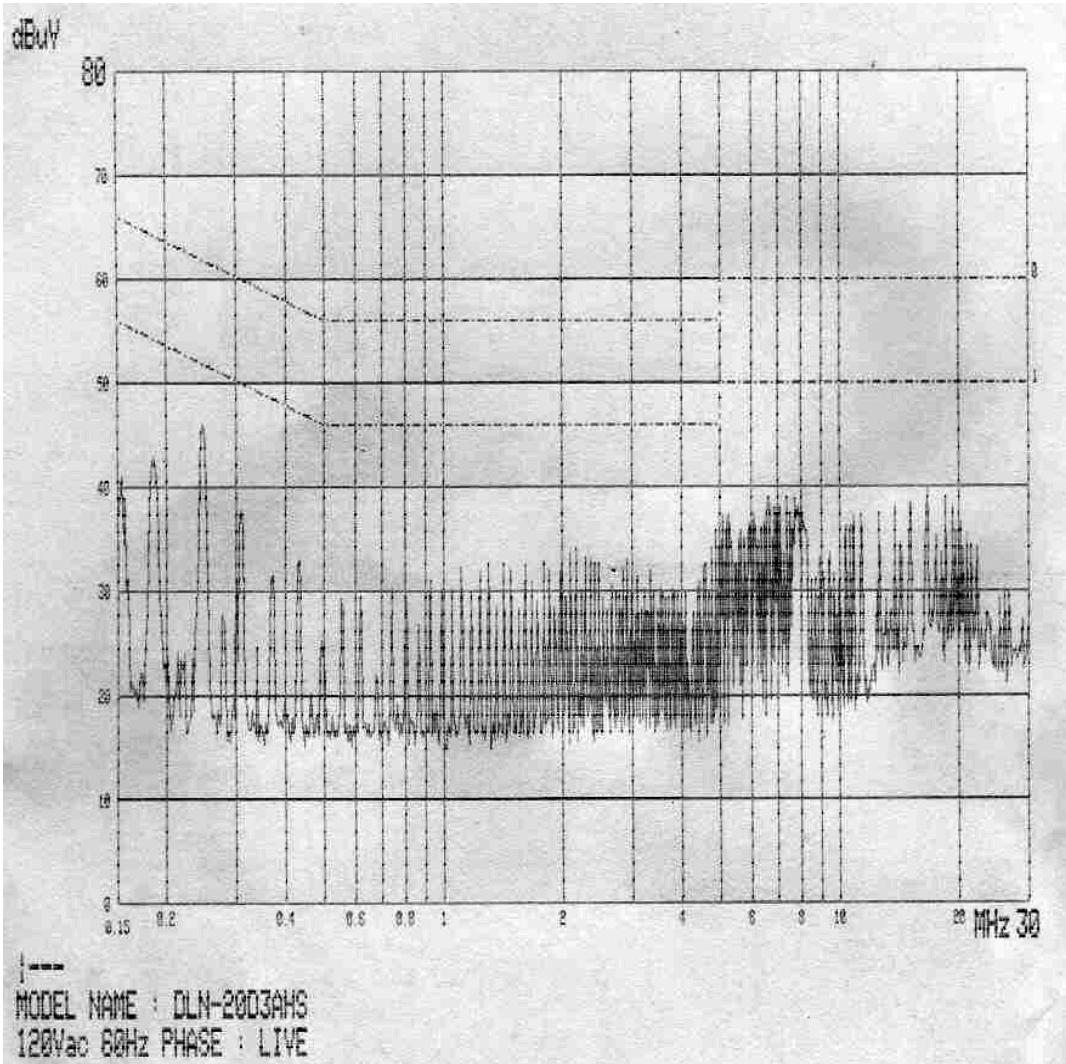
◆ Test Date      September 15, 2004

◆ Test Area      Shielded room No.1

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

**Conducted Emissions**

Scrolling "H" Pattern LIVE Line

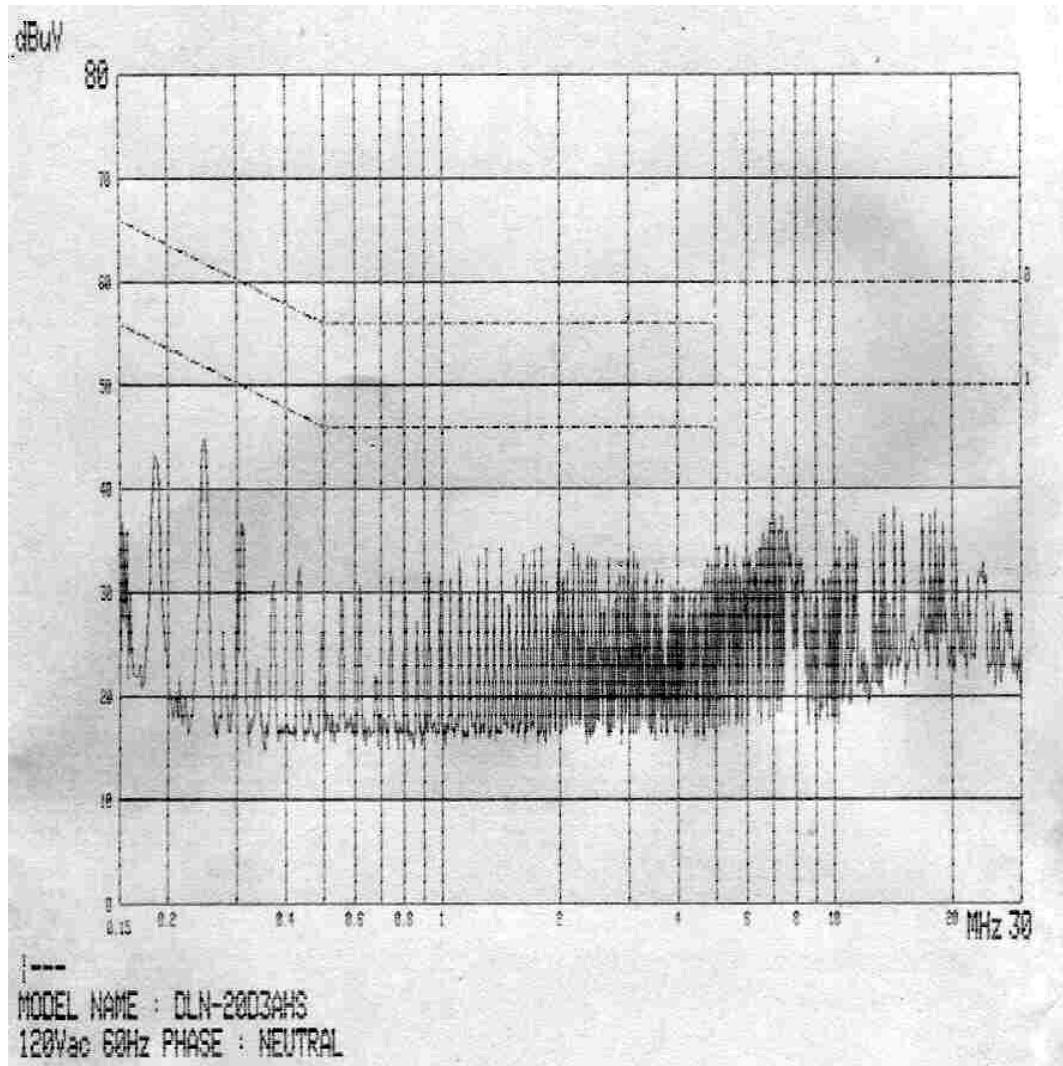


Freq. [MHz]	Measurement [dB $\mu$ V]		Limit [dB $\mu$ V]		Insertion Loss	Cable Loss	Result [dB $\mu$ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.154	38.3	11.4	65.8	55.8	0.1	0.5	38.9	12.0	26.9	43.8
0.185	41.0	31.3	64.3	54.3	0.1	0.5	41.6	31.9	22.7	22.4
0.247	44.3	35.2	61.9	51.9	0.1	0.4	44.8	35.7	17.1	16.2

Note :

Conducted Emissions

Scrolling "H" Pattern NEUTRAL Line



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
0.185	41.8	30.8	64.3	54.3	0.1	0.5	42.4	31.4	21.9	22.9
0.247	43.4	34.0	61.9	51.9	0.1	0.4	43.9	34.5	18.0	17.4
0.308	35.3	25.2	60.0	50.0	0.1	0.4	35.8	25.7	24.2	24.3

Note :

## TEST CONDITIONS AND DATA

### Radiated Emission

[Applicable]

#### ◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESVS 10	Test Receiver	Rohde & Schwarz	Jul. 15, 2004	861744/004
VULB 9160	Antenna	Schwarzbeck	Jun. 10, 2004	3048

#### ◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program            Scrolling "H" Patterns on the windows

◆ Test Date            September 16, 2004

◆ Test Area            Open site No.2

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

**Radiated Emissions**

Mode	Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
640x480, 72Hz	115.1	20.7	10.9	2.5	V	34.1	43.5	9.4
	139.8	24.9	12.7	2.8	V	40.4	43.5	3.1
	155.6	16.6	13.0	2.9	H	32.5	43.5	11.0
	204.7	19.5	9.2	3.3	H	32.0	43.5	11.5
	625.7	14.0	19.1	6.9	H	40.0	46.0	6.0
<hr/>								
800x600, 72Hz	63.9	16.9	10.5	1.7	V	29.1	40.0	10.9
	113.2	21.3	10.6	2.4	V	34.3	43.5	9.2
	137.8	24.4	12.5	2.8	V	39.7	43.5	3.8
	142.7	19.4	12.7	2.8	V	34.9	43.5	8.6
	157.5	19.4	13.1	2.9	H	35.4	43.5	8.1

*Note:*

Appendix A. The EUT Photos



Front View



Rear View

Appendix A. The EUT Photos



Adaptor



Adaptor Label

**Appendix B. The Test Setup Photos**

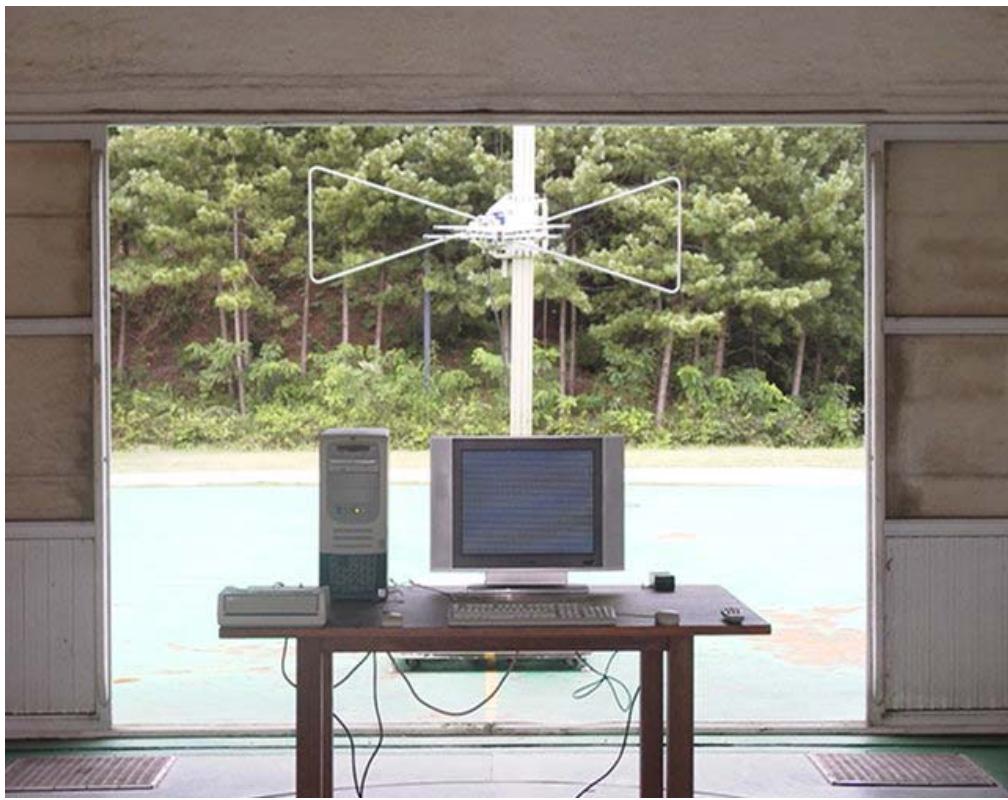


**Conducted Emissions - Front View**



**Conducted Emissions - Rear View**

**Appendix B. The Test Setup Photos**



**Radiated Emissions** - Front View



**Radiated Emissions** - Rear View