



## EMISSION TEST REPORT

Test report file No. : **02-IST-100/FA**Date of issue : Jun. 10, 2002Model / Type No. : HLM151X☐ Basic ☒ AlternateKind of product : LCD MonitorBrand name : Wooyoung TelecomApplicant : Wooyoung Telecom Co., Ltd.Address : Youhwa BD, 7F, 995-16, Daechi-Dong, Kangnam-Ku, Seoul, KoreaManufacturer : Wooyoung Telecom Co., Ltd.Address : Youhwa BD, 7F, 995-16, Daechi-Dong, Kangnam-Ku, Seoul, KoreaLicense holder : Wooyoung Telecom Co., Ltd.**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.

## DIRECTORY

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### B) Test Data.

|                             |                    |                |
|-----------------------------|--------------------|----------------|
| Conducted emissions (Mains) | : 450 kHz - 30 MHz | <u>12 ~ 14</u> |
| Radiated emissions          | : 30 MHz – 1 GHz   | <u>15 ~ 16</u> |

### C) Appendix

## **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.**

San 21-8 Goan-Ri, Baekam-Myun, Yongin-Si, Kyunggi-Do, Korea

International - Tel : 82-31 - 333 - 4093. Fax : 82-31 - 333 - 4094.

Domestic - Tel : 031 - 333 - 4093. Fax : 031 - 333 - 4094.

## EQUIPMENT UNDER TEST

### Equipment Description :

|                      |                                             |
|----------------------|---------------------------------------------|
| LCD Pannel Type No : | LM150X04<br>(LG Philips)                    |
| Frequency Range :    | Vertical 55 ~ 75 Hz, Horizontal 31 ~ 60 kHz |
| PC Input Signal :    | H / V separated (TMDS)                      |
| Power Supply Input : | 100 ~ 240 Vac, 50/60 Hz                     |
| Power consumption :  | 25 W (Max)                                  |
| Micom Clock :        | 12.0 MHz, 14.318 MHz on the main board      |

### 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 : 1024 X 768, 75 Hz  
 Activating Speaker (Sound Play mode)

### 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               | SG01902402  |
| Keyboard  | SK-2502C       | HP               | M0004102821 |
| Mouse1    | M-S48A         | HP               | LZE01251424 |
| Printer   | A0302384       | Northern Telecom | 26633S60168 |
| Mouse2    | M-MD14-2       | Logitech         | N/A         |

Connecting Interface Cables :

- Unshielded AC power cable : 1.8 m
- Unshielded Speak cable : 1.0 m
- Shielded monitor's signal cable : 1.5 m
- Shielded printer's signal cable : 1.8 m

## **Description of Difference**

(Difference between Original and Changed HLM151X)

1. The applicant change :

From Han Gil Telecom Co., Ltd to Wooyoung Telecom Co., Ltd.

2. Alternate components :

| Item           |              | Original HLM151X | Changed HLM151X  |
|----------------|--------------|------------------|------------------|
| TFT LCD Pannel | Type No.     | LM151X2          | LM150X04         |
|                | Manufacturer | LG PHILIPS       | LG PHILIPS       |
| Power board    | Type No.     | U07-1138         | U07-1161         |
|                | Manufacturer | SUN KOREA        | SUN KOREA        |
| Function board | Type No.     | 165 X 136.5      | 180 X 47.5       |
|                | Manufacturer | HAN GIL Telecom  | Wooyoung Telecom |
| A/D board      | Type No.     | TTL              | TMDS             |
|                | Manufacturer | HAN GIL Telecom  | Wooyoung Telecom |
| Speak board    | Type No.     | -                | DS4-V-0          |
|                | Manufacturer |                  | Wooyoung Telecom |

3. Shape of Front Cover :



Original HLM151X



Changed HLM151X

## **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 measurements 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 50 $\Omega$ /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. G. Kim / Research Engineer  
IST EMC Lab.

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. G. Kim / Research Engineer  
IST EMC Lab.

## **TEST RESULT**

### **Conducted emissions : 450 kHz - 30 MHz**

The requirements are.

☒ KEPT

☐ NOT KEPT

Min. limit margin

3.1 dB at 18.002 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

4.3 dB at 393.8 MHz

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



## **TEST SETUP (Photos)**

Type : HLM151X



Conducted Emissions 0.15 MHz - 30 MHz



## **TEST SETUP (Photos)**

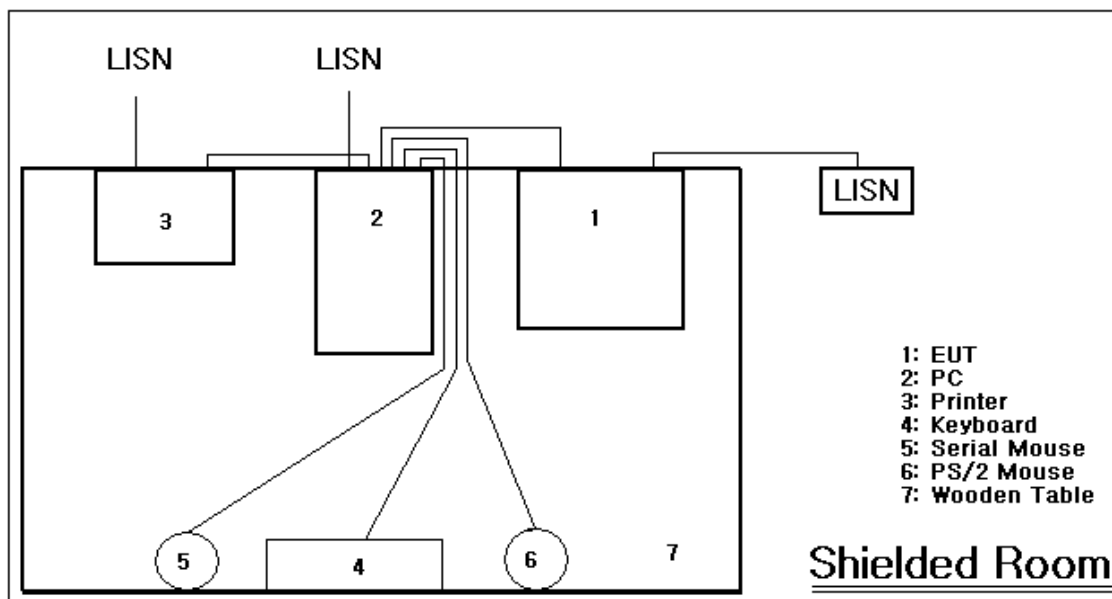
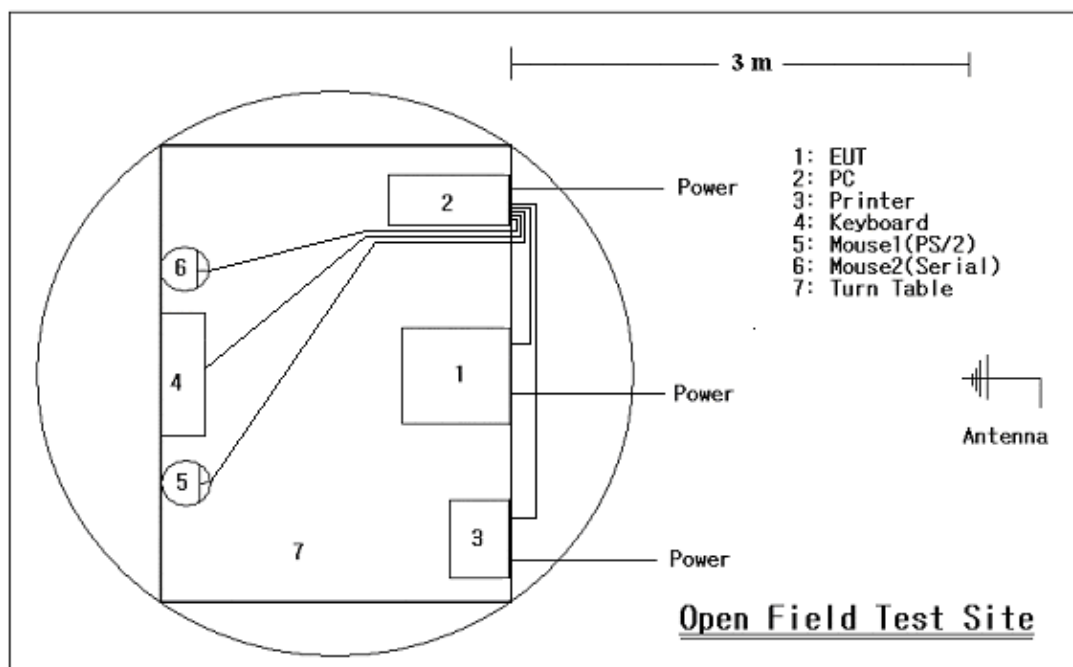
Type : HLM151X



Radiated Emissions 30 MHz - 1000 MHz



## **TEST SETUP (Drawings)**

Type : HLM151XConducted Emissions 0.15 MHz - 30 MHzRadiated Emissions 30 MHz - 1000 MHz

## Conducted Emission Test Data

Type HLM151X  
 Manufacturer Wooyoung Telecom Co., Ltd.  
 Operation mode Scrolling "H" pattern display 1024 x 768, 75Hz  
 Sound Play mode  
 Environmental Conditon Temperature : 22 °C  
 Humidity : 40 %  
 Atmospheric pressure : 1000 mbar  
 Date Jun. 04, 2002

### Highest Emissions ralative to the limit

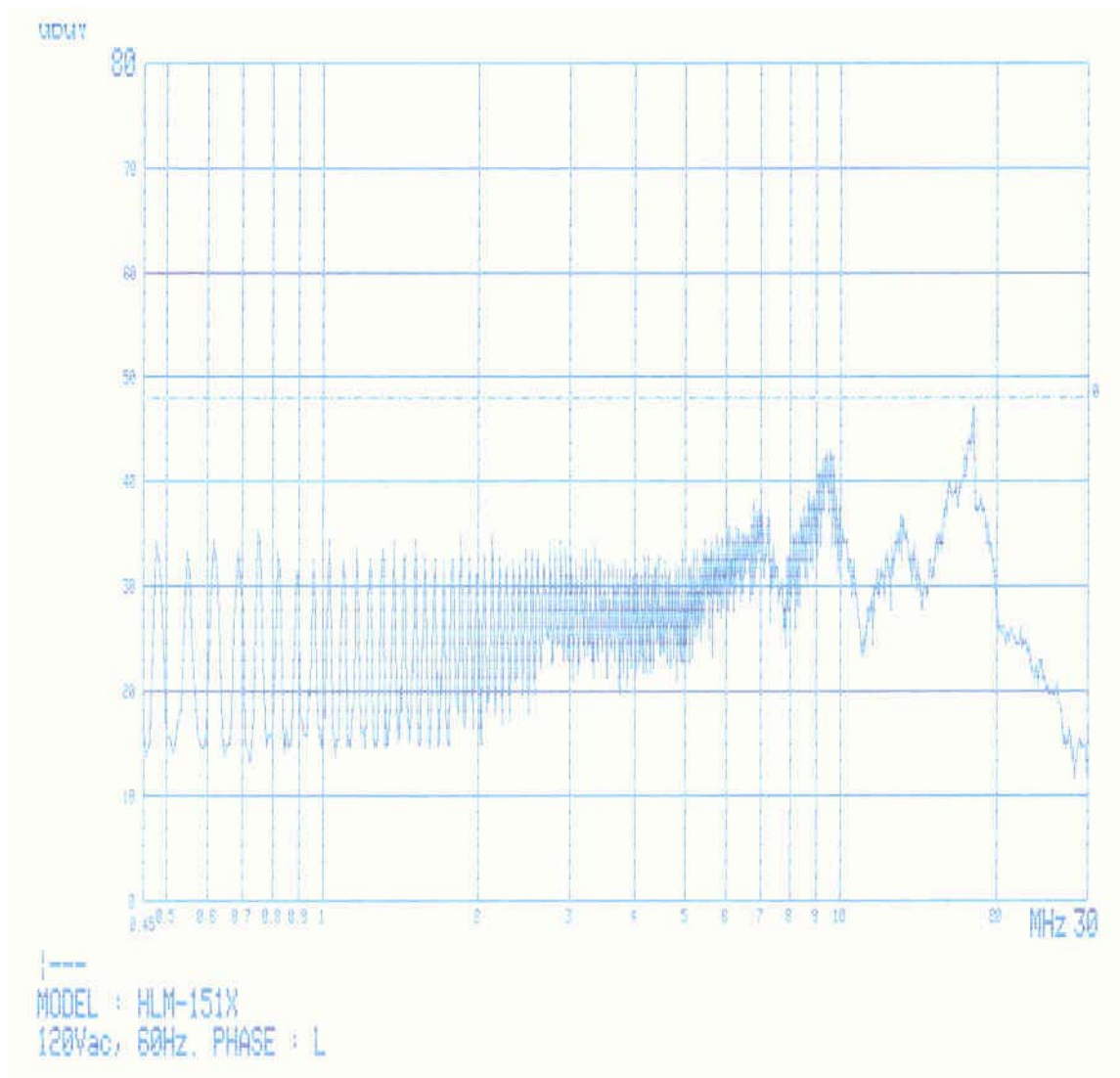
| Frequency<br>[MHz] | Reading<br>[dBμV] | Insertion<br>loss<br>[dB] | Phase<br>(L1/N) | Result<br>[dBμV] | Limit<br>[dBμV] | Margin<br>[dB] |
|--------------------|-------------------|---------------------------|-----------------|------------------|-----------------|----------------|
| 0.549              | 31.2              | 0.8                       | L1              | 32.0             | 48.0            | 16.0           |
| 0.962              | 30.8              | 0.8                       |                 | 31.6             | 48.0            | 16.4           |
| 1.373              | 32.3              | 0.8                       |                 | 33.1             | 48.0            | 14.9           |
| 9.390              | 38.7              | 0.8                       |                 | 39.5             | 48.0            | 8.5            |
| 14.209             | 33.1              | 0.8                       |                 | 33.9             | 48.0            | 14.1           |
| 18.002             | 44.1              | 0.8                       |                 | 44.9             | 48.0            | 3.1            |
| 0.551              | 31.3              | 0.8                       | N               | 32.1             | 48.0            | 15.9           |
| 1.578              | 28.9              | 0.8                       |                 | 29.7             | 48.0            | 18.3           |
| 2.675              | 30.5              | 0.8                       |                 | 31.3             | 48.0            | 16.7           |
| 7.094              | 34.6              | 0.8                       |                 | 35.4             | 48.0            | 12.6           |
| 14.821             | 33.4              | 0.8                       |                 | 34.2             | 48.0            | 13.8           |
| 18.279             | 41.7              | 0.8                       |                 | 42.5             | 48.0            | 5.5            |

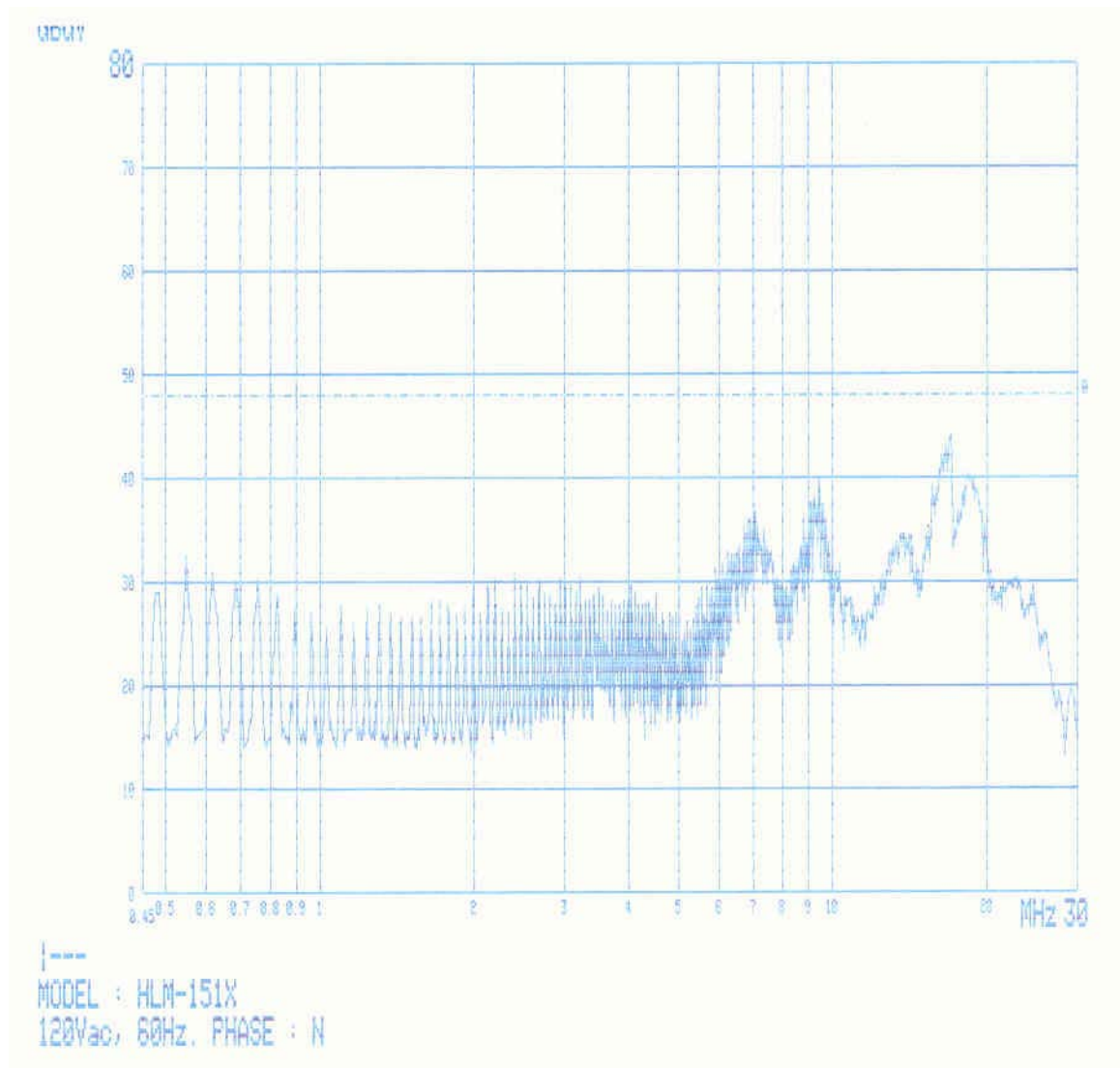
**Cable loss are less than 0.1 dB**

\*L1 : Live Line

\*\*N : Neutral Line

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





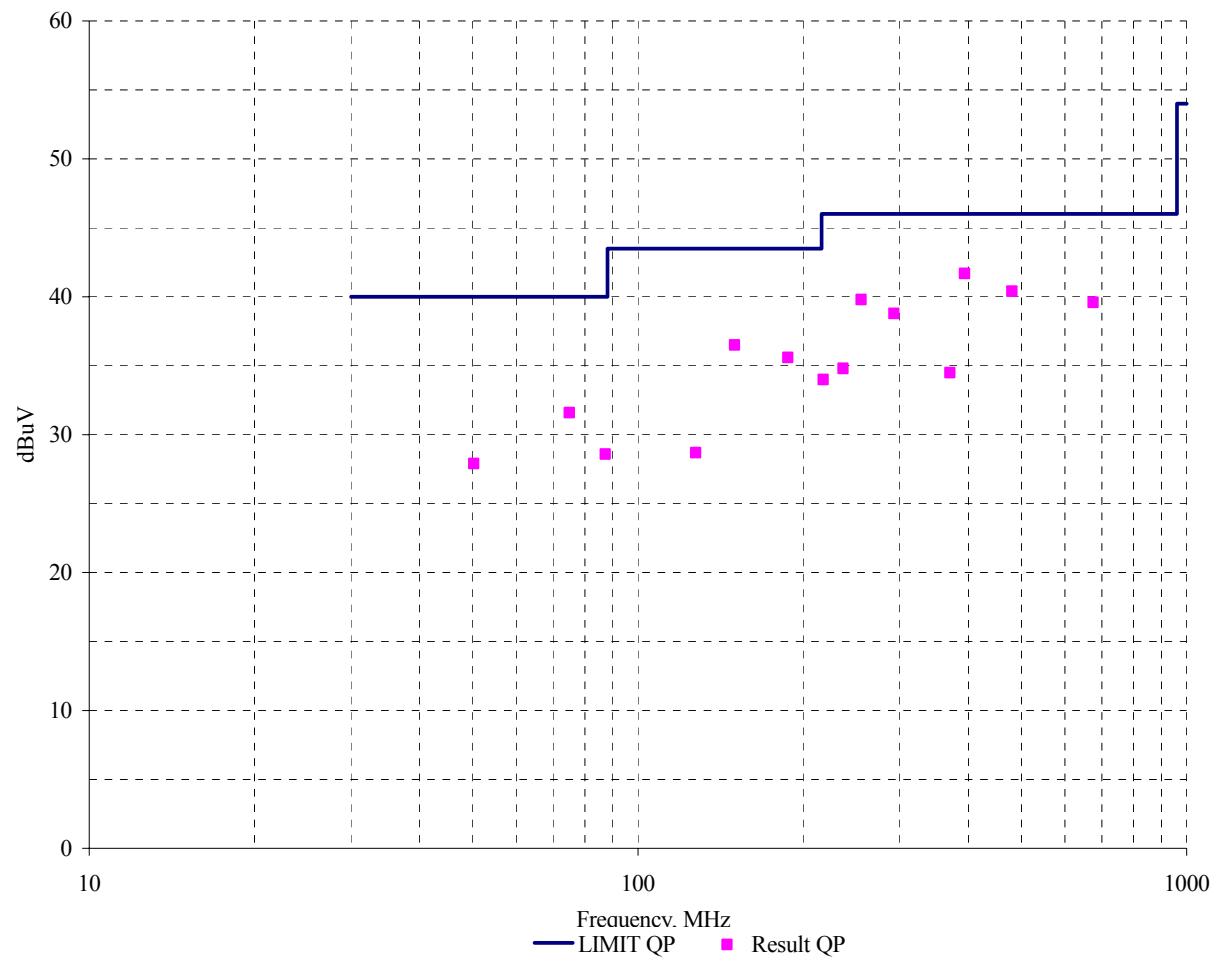


## **Radiation Test Data**

|                        |                                                |   |           |
|------------------------|------------------------------------------------|---|-----------|
| Type                   | HLM151X                                        |   |           |
| Manufacturer           | Wooyoung Telecom Co., Ltd.                     |   |           |
| Operation mode         | Scrolling "H" pattern display 1024 x 768, 75Hz |   |           |
|                        | Sound Play mode                                |   |           |
| Environmental Conditon | Temperature                                    | : | 22 °C     |
|                        | Humidity                                       | : | 40 %      |
|                        | Atmospheric pressure                           | : | 1000 mbar |
| Test distance          | 3 m                                            |   |           |
| Antenna                | VULB9160                                       |   |           |
| Date                   | Jun. 03, 2002                                  |   |           |

| Freq.<br>[MHz] | Reading<br>[dBuV] | Antenna<br>Factor<br>[dB] | Cable<br>Loss<br>[dB] | Angle<br>[deg] | Height<br>[cm] | Polar<br>[H/V] | Result<br>[dBuV] | Limit<br>[dBuV] | Margin<br>[dB] |
|----------------|-------------------|---------------------------|-----------------------|----------------|----------------|----------------|------------------|-----------------|----------------|
| 50.2           | 16.0              | 10.6                      | 1.3                   | 107            | 100            | V              | 27.9             | 40.0            | 12.1           |
| 75.0           | 21.2              | 8.8                       | 1.6                   | 110            | 100            | V              | 31.6             | 40.0            | 8.4            |
| 87.2           | 19.7              | 7.2                       | 1.7                   | 58             | 100            | V              | 28.6             | 40.0            | 11.4           |
| 127.4          | 15.2              | 10.5                      | 2.1                   | 120            | 100            | V              | 28.7             | 43.5            | 15.7           |
| 150.0          | 22.0              | 12.2                      | 2.3                   | 255            | 100            | V              | 36.5             | 43.5            | 7.0            |
| 187.5          | 23.6              | 9.5                       | 2.5                   | 267            | 100            | V              | 35.6             | 43.5            | 7.9            |
| 217.5          | 22.8              | 8.5                       | 2.7                   | 264            | 100            | V              | 34.0             | 46.0            | 12.0           |
| 236.3          | 22.0              | 9.9                       | 2.9                   | 310            | 100            | V              | 34.8             | 46.0            | 11.2           |
| 255.0          | 26.1              | 10.9                      | 2.8                   | 260            | 100            | V              | 39.8             | 46.0            | 6.2            |
| 292.6          | 23.8              | 11.8                      | 3.2                   | 250            | 100            | V              | 38.8             | 46.0            | 7.2            |
| 370.0          | 18.7              | 12.1                      | 3.7                   | 72             | 400            | H              | 34.5             | 46.0            | 11.5           |
| 393.8          | 24.4              | 13.1                      | 4.2                   | 53             | 387            | H              | 41.7             | 46.0            | 4.3            |
| 480.4          | 21.0              | 14.6                      | 4.8                   | 150            | 281            | H              | 40.4             | 46.0            | 5.6            |
| 675.0          | 16.5              | 18.1                      | 5.0                   | 285            | 104            | V              | 39.6             | 46.0            | 6.4            |

MEASUREMENT OF DISTURBANCE RADIATION





## **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 : Jun. 03, 2002

End of testing : Jun. 04, 2002

**Reviewed by :**



Joon H. Lee. EMC Manager  
Daewoo EMC Lab.

**Approved by :**



G, Chung. Chief of EMC Lab.