



## HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

INT'L STANDARD CERTIFICATION TEAM  
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA  
TEL : +82 31 639 8518 FAX : +82 31 639 8525 www.hctec.co.kr

# CERTIFICATION

**Manufacture;**  
**IMAGEQUEST CO., LTD.**  
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI,  
KYOUNKI-DO, 467-701, KOREA

**IMAGEQUEST FRN : 0005-8664-39**

**Date of Issue: JANUARY 18, 2002**  
**Test Report No.: HCT-F02-0102**  
**Test Site: HYUNDAI CALIBRATION & CERTIFICATION**  
**TECHNOLOGIES CO., LTD.**

**HCT FRN : 0005-8664-21**

**FCC ID :**

**PJIL15B0C060**

**MODEL / TYPE :**

**L1510B**

**FCC Rule Part(s):** Part 15 & 2; ET Docket 95-19  
**Classification:** FCC Class B Peripheral Device (JBP)  
**Standard(s):** FCC Class B: 1998 (CISPR 22)  
**Equipment(EUT) Type:** 15" LCD Monitor  
**Max Resolution:** 1024X768 (@60KHz/ 75Hz)  
**Port/ Connector(s):** 15-pin D-sub VGA connector, USB 1 upstream port and 2 downstream ports  
Audio port, Ear Phone port.  
**LCD PANEL:** SAMSUNG ELECTRONICS CO.,LTD. (LTM150XH-L01)

The device bearing the trade name and model specified above, has been shown to comply 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.(See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HYUNDAI C-Tech. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse of 1988,21 U.S.C.853(a).

Report prepared by : Ki-Soo Kim  
Manager of EMC Tech. Part



## TABLE OF CONTENTS

	<b>PAGE</b>
<b>1. GENERAL INFORMATION.....</b>	<b>3</b>
1.1 Product Description.....	3
1.2 Related submittal(s)/Grant(s).....	3
1.3 Tested System Details.....	4
1.4 Test Methodology.....	4
1.5 Test Facility.....	4
<b>2. SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
2.1 Justification.....	5
2.2 EUT Exercise Software.....	5
2.3 Cable Description.....	6
2.4 Noise Suppression Parts on Cable.....	6
2.5 Equipment Modifications.....	7
2.6 Configuration of Tested System.....	8
<b>3. PRELIMINARY TESTS.....</b>	<b>9</b>
3.1 Power line Conducted Emissions Tests.....	9
3.2 Radiated Emissions Tests.....	9
<b>4. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY.....</b>	<b>9</b>
4.1 Conducted Emission Tests.....	10
4.2 Radiated Emission Tests.....	11
<b>5. FIELD STRENGTH CALCULATION.....</b>	<b>12</b>
<b>6. LIST OF TEST EQUIPMENT .....</b>	<b>13</b>

<b>ATTACHMENT A .....</b>	<b>ID Label / Location Info.</b>
<b>ATTACHMENT B.....</b>	<b>External Photos.</b>
<b>ATTACHMENT C .....</b>	<b>Block Diagram..</b>
<b>ATTACHMENT D .....</b>	<b>Test Setup Photos.</b>
<b>ATTACHMENT E .....</b>	<b>User's Manual.</b>
<b>ATTACHMENT F .....</b>	<b>Internal Photos.</b>

# 1. GENERAL INFORMATION

## 1.1 Product Description

The ImageQuest CO., LTD. Model L1510B (referred to as the EUT in this report) is a 15" LCD Monitor HOR. Freq. 60KHz w/max. Resolution of 1024X768 . Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	PLASTIC
LIST OF EACH OSC. OR XTAL. FREQ.(FREQ. 1MHz)	12MHz, 20MHz
POWER REQUIREMENT	DC 12V/5V --- 2.0A/2.0A
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 2 LAYER POWER BOARD 1 LAYER INVERTER BOARD 2 LAYER AUDIO & USB BOARD 2 LAYER
MAX. RESOLUTION	1024X768 (@60KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31KHz 60KHz
V-SYNC FREQUENCY RANGE	56Hz 75Hz
LCD TYPE	15" ( LCD Type : LTM150XH-L01 )

## 1.2 Related Submittal(s) / Grant(s)

ORIGINAL SUBMITTAL ONLY

### 1.3 Tested System Details

The Model names for all equipment, plus descriptions used in the tested system (including inserted cards) are:

TYPE DEVICE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
MONITOR (EUT)	IMAGEQUEST CO., LTD.	L1510B	PJIL15B0C060	HOST
PC(HOST)	H/P	DTPC-17	DoC	N/A
KEY BOARD	H/P	SK-2501-2D-K	GYUR385K	HOST
PRINTER	H/P	HP895C	DoC	HOST
MODEM	3COM CORPORATION	56K FAX MODEM	DoC	HOST
VIDEO CARD	DIAMOND	3D3000	DoC	HOST
MOUSE	H/P	INTELLIMOUSE	DZL211029	HOST
EAR PHONE	HYUNDAI MULTICAV	BOOM MIC HEADSET	N/A	HOST
USB MOUSE	LOGITECH	LZA04152669	DoC	EUT
USB FLASH DRIVE	SOFT BANK	E-D900-00-2988	DoC	EUT

### 1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at an antenna to EUT distance of 10 meters.

### 1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO, 467-701,KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 24,2000(Confirmation Number: EA90661)

## 2.SYSTEM TEST CONFIGURATION

### 2.1 Justification

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following components and I/O cards inside the E.U.T were used.

DEVICE TYPE	MANUFACTURE	MODEL/PART NUMBER
MAIN BOARD	ImageQuest CO., Ltd.	3041001042
POWER BOARD	C&C TECH CO.,LTD.	3610200093
OSD BOARD	ImageQuest CO., Ltd.	3010700794
INVERTOR BOARD	ImageQuest CO., Ltd.	3610400244
AUDIO & USB BOARD	ImageQuest CO., Ltd.	3010700795
LCD BOARD	SAMSUNG ELECTRONICS CO.,LTD.	LTM150XH-L01

### 2.2 EUT exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disc, was inserted into drive A and is auto starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is :(1) Display test, (2) RS 232 test (3) Key board test,(4) Printer test,(5) FDD test,(6) HDD test. The complete cycle takes about 20 seconds and is repeated continuously. As the keyboard and mouse are strictly input devices, no data is transmitted to them during test. They are however, continuously scanned for data input activity. The video resolution modes setup and change program was used during the radiated and conducted emission testing.

## 2.3 Cable Description

	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
MONITOR(EUT)	N	Y	1.8(P), 1.5(D)
PC(HOST)	N	N/A	1.8(P)
PRINTER	N	Y	2.0(P),1.8(D)
KEY BOARD	N/A	Y	2.0(D)
MODEM	N	Y	2.0(P),0.8(D)
MOUSE	N/A	Y	1.8(D)
AUDIO CABLE	N/A	Y	2.0(D)
USB MOUSE	N/A	Y	0.8(D)
USB FRESH DRIVER	N/A	N/A	N/A

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

## 2.4 Noise Suppression Parts on Cable. (I/O CABLE)

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
MONITOR(EUT)	Y	BOTH END	Y	BOTH END
PRINTER	Y	PC END	Y	BOTH END
KEY BOARD	Y	PC END	Y	PC END
MODEM	Y	PC END	Y	BOTH END
MOUSE	N	N/A	Y	PC END
AUDIO CABLE	Y	BOTH END	Y	BOTH END
USB MOUSE	Y	EUT END	Y	EUT END
USB FRESH DRIVER	N	N/A	Y	EUT END

## **2.5 Equipment Modifications**

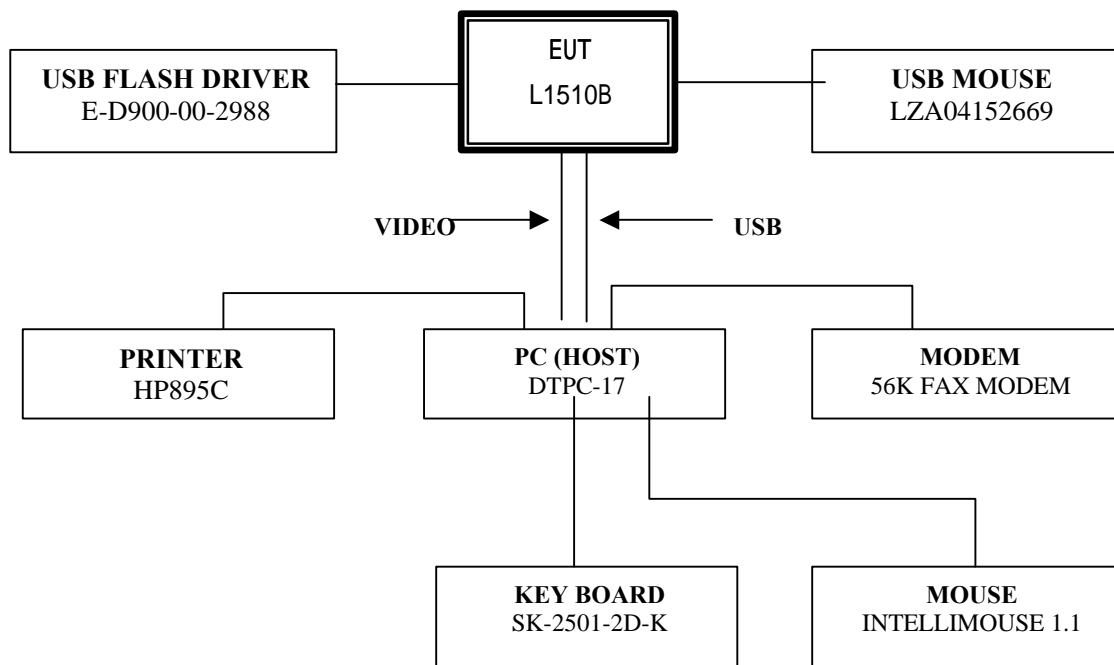
N/A

## 2.6 Configuration of Test system

**Line Conducted Test** : EUT was connected to LISN, all other supporting equipment were connected to another LISN.  
Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

**Radiated Emission Test** : Preliminary Radiated Emissions tests were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating condition. Final Radiated Emission tests were conducted at 10 meter open area test site.

[Configuration of Tested System]



### 3. PRELIMINARY TESTS

#### 3.1 AC Power line Conducted Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 350 MHz	1024X768 (60KHz/75Hz)	X
	1024X768 (48.4KHz/60Hz)	
	1024X768 (56.5KHz/70Hz)	
	720X400 (31.5KHz/70Hz)	
	800 x 600 (46.7 KHz/75Hz)	
	640 x 480 (31.5KHz/60Hz)	

#### 4.2 Radiated Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 350 MHz	1024X768 (60KHz/75Hz)	X
	1024X768 (48.4KHz/60Hz)	
	1024X768 (56.5KHz/70Hz)	
	720X400 (31.5KHz/70Hz)	
	800 x 600 (46.7 KHz/75Hz)	
	640 x 480 (31.5KHz/60Hz)	

Tested by Kyoung-Houn SEO / Engineer

Date : NOVEMBER 5, 2001

## 4. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

### 4.1 Conducted Emission Test

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Humidity Level	: 32%	Temperature	: 20
Limit apply to	: CISPR 22		
Type of Tests	: CLASS B		
Date	: DECEMBER 6 , 2001		
Result	: PASSED BY -5.1dB		
EUT	: 15" LCD MONITOR		

Operating Condition : 1024X768 (Hf : 60KHz, Vf : 75Hz)

Detector : CISPR Quasi-Peak (6 dB Bandwidth : 9 KHz)  
CISPR Average(6 dB Bandwidth : 9 KHz)

Line Conducted Emission Tabulated Data

Power Line Conducted Emissions			CISPR 22		
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)	Detector Mode
1.30	40.9	NEUTRAL	46.0	5.1	Average
0.76	50.5	NEUTRAL	56.0	5.5	Quasi-Peak
1.22	39.8	NEUTRAL	46.0	6.2	Average
1.71	39.7	NEUTRAL	46.0	6.3	Average

NOET:

1. All video modes and resolutions were investigated and the worst-case emissions are reported  
Other video modes & resolution were tested and found to be in compliance.

Measured by : Kyoung-Houn SEO / Engineer

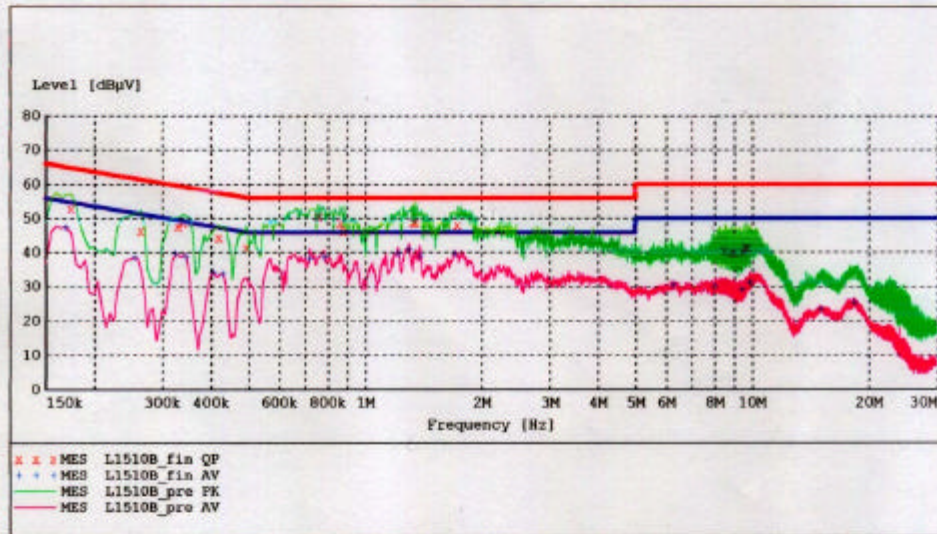
Date : DECEMBER 6, 2001

**HYUNDAI C-TECH. CO., LTD.**  
**EMC TEST LAB.**

EUT: L1510B  
 Manufacturer:  
 Operating Condition:  
 Test Site: Shield Room  
 Operator:  
 Test Specification:  
 Comment: N  
 Start of Test: 12/6/01 / 1:40:15PM

**SCAN TABLE: "EN 55022 V (PKH)"**

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency 150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
500.0 kHz	5.0 MHz	5.0 kHz	Average	10.0 ms	9 kHz	CABLE LOSS (NEW)
			MaxPeak			
			Average			


**MEASUREMENT RESULT: "L1510B\_fin QP"**

12/6/01 1:44PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.175000	52.70	0.5	65	12.1	1	---
0.265000	46.40	0.5	61	14.9	1	---
0.330000	47.70	0.5	60	11.8	1	---
0.340000	48.70	0.5	59	10.5	1	---
0.420000	44.30	0.5	57	13.2	1	---
0.495000	41.30	0.5	56	14.7	1	---
0.760000	50.50	0.5	56	5.5	1	---
0.865000	48.60	0.5	56	7.4	1	---
0.885000	46.20	0.5	56	9.8	1	---
1.335000	48.80	0.5	56	7.2	1	---
1.355000	48.90	0.5	56	7.1	1	---
1.740000	48.00	0.6	56	8.0	1	---
8.530000	40.50	1.2	60	19.5	1	---
8.905000	40.10	1.2	60	19.9	1	---

**MEASUREMENT RESULT: "L1510B\_fin QP"**  
(continued)

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
9.070000	40.00	1.2	60	20.0	1	---
9.530000	40.20	1.3	60	19.8	1	---
9.665000	41.30	1.3	60	18.7	1	---
9.780000	41.40	1.3	60	18.6	1	---

**MEASUREMENT RESULT: "L1510B\_fin AV"**  
12/6/01 1:44PM

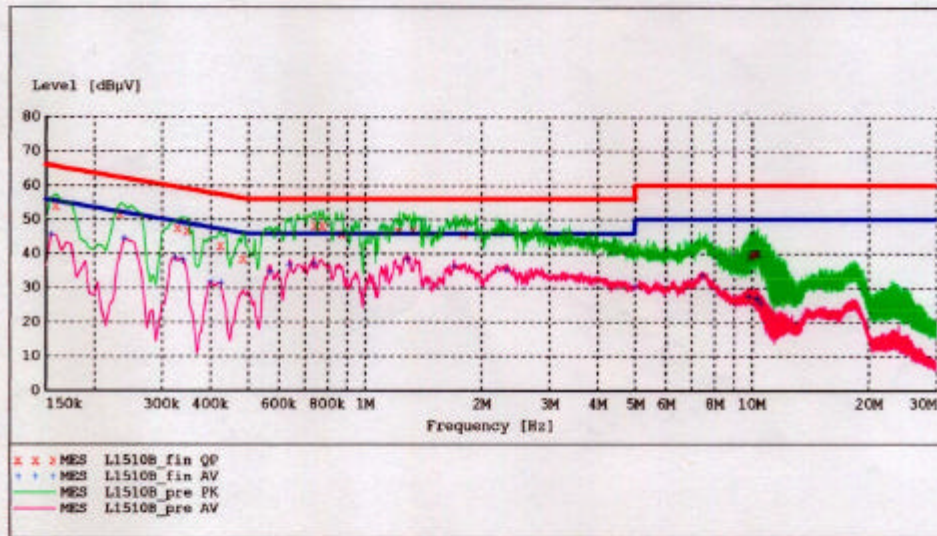
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.170000	47.40	0.5	55	7.6	1	---
0.255000	38.70	0.5	52	12.9	1	---
0.325000	39.80	0.5	50	9.8	1	---
0.345000	38.80	0.5	49	10.3	1	---
0.405000	34.30	0.5	48	13.5	1	---
0.430000	33.70	0.5	47	13.6	1	---
0.720000	38.40	0.5	46	7.6	1	---
0.785000	38.80	0.5	46	7.2	1	---
1.220000	39.80	0.5	46	6.2	1	---
1.305000	40.90	0.5	46	5.1	1	---
1.390000	39.10	0.5	46	6.9	1	---
1.710000	39.70	0.5	46	6.3	1	---
6.260000	30.60	1.0	50	19.4	1	---
8.040000	30.10	1.2	50	19.9	1	---
9.475000	29.20	1.2	50	20.8	1	---
9.870000	31.30	1.3	50	18.7	1	---
15.065000	23.40	1.5	50	26.6	1	---
18.415000	25.30	1.7	50	24.7	1	---

**HYUNDAI C-TECH. CO., LTD.**  
**EMC TEST LAB.**

EUT: L1510B  
 Manufacturer:  
 Operating Condition:  
 Test Site: Shield Room  
 Operator:  
 Test Specification:  
 Comment: H  
 Start of Test: 12/6/01 / 1:45:08PM

**SCAN TABLE: "EN 55022 V (PKH)"**

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
500.0 kHz	5.0 MHz	5.0 kHz	Average	10.0 ms	9 kHz	CABLE LOSS (NEW)
			MaxPeak			
			Average			


**MEASUREMENT RESULT: "L1510B\_fin QP"**

12/6/01 1:49PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.160000	54.00	0.5	66	11.4	1	---
0.235000	51.60	0.5	62	10.7	1	---
0.330000	47.60	0.5	60	11.8	1	---
0.350000	46.90	0.5	59	12.1	1	---
0.425000	42.40	0.5	57	14.9	1	---
0.485000	38.70	0.5	56	17.6	1	---
0.745000	48.30	0.5	56	7.7	1	---
0.780000	48.20	0.5	56	7.8	1	---
0.875000	45.80	0.5	56	10.2	1	---
1.230000	46.80	0.5	56	9.2	1	---
1.340000	47.10	0.5	56	8.9	1	---
1.815000	45.90	0.6	56	10.1	1	---
9.940000	39.40	1.3	60	20.6	1	---
10.100000	40.00	1.3	60	20.0	1	---

**MEASUREMENT RESULT: "L1510B\_fin QP"**

(continued)

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
10.140000	40.00	1.3	60	20.0	1	---
10.295000	40.30	1.3	60	19.7	1	---
10.345000	40.40	1.3	60	19.6	1	---
10.430000	40.30	1.3	60	19.7	1	---

**MEASUREMENT RESULT: "L1510B\_fin AV"**

12/6/01 1:49PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.155000	45.70	0.5	56	10.0	1	---
0.240000	44.60	0.5	52	7.5	1	---
0.325000	39.00	0.5	50	10.6	1	---
0.340000	38.30	0.5	49	10.9	1	---
0.400000	31.90	0.5	48	16.0	1	---
0.425000	31.60	0.5	47	15.7	1	---
0.570000	34.90	0.5	46	11.1	1	---
0.640000	36.90	0.5	46	9.1	1	---
0.740000	37.10	0.5	46	8.9	1	---
1.290000	38.60	0.5	46	7.4	1	---
1.705000	36.40	0.5	46	9.6	1	---
2.330000	35.30	0.6	46	10.7	1	---
5.000000	30.60	0.9	46	15.4	1	---
7.450000	33.60	1.1	50	16.4	1	---
9.870000	27.60	1.3	50	22.4	1	---
10.335000	27.00	1.3	50	23.0	1	---
10.380000	26.80	1.3	50	23.2	1	---
10.595000	25.40	1.3	50	24.6	1	---

## 4.2 Radiated Emissions Tests

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

Humidity Level : 32 %                      Temperature : 16  
 Limit apply to : CISPR 22  
 Type of Tests : CLASS B  
 Date : NOVEMBER 20, 2001  
 Result : PASSED BY -3.1dB

EUT : 15" LCD MONITOR  
 Operating Condition : 1024X768 (Hf :60 kHz, Vf : 75 Hz)  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
71.9	17.79	5.71	1.80	H	25.3	30.0	-4.7
119.1	9.54	12.96	2.30	V	24.8	30.0	-5.2
120.5	10.29	13.41	2.40	V	26.1	30.0	-3.9
126.5	10.74	13.76	2.40	V	26.9	30.0	-3.1
175.8	6.35	15.05	2.70	H	24.1	30.0	-5.9
200.0	4.82	15.78	3.00	H	23.6	30.0	-6.4
401.5	10.80	16.50	4.20	V	31.5	37.0	-5.5
545.0	7.75	19.15	5.30	H	32.2	37.0	-4.8
602.8	5.26	20.74	5.80	V	31.8	37.0	-5.2
616.8	3.62	21.08	5.90	V	30.6	37.0	-6.4
748.0	4.76	22.54	6.40	H	33.7	37.0	-3.3
772.5	4.64	22.76	6.50	H	33.9	37.0	-3.1

**NOTE:**

- 1.All video modes and resolutions were investigated and the worst-case emissions are reported.
- 2.Other video modes & resolution were tested and found to be in compliance.

Measured by Kyoung-Houn Seo / Engineer

Date : NOVEMBER 20 , 2001

## 5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The 30 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm } [(30 \text{ dBuV/m})/20] = 31.6 \text{ uV/m}$$

## 6. LIST OF TEST EQUIPMENT

<u>TYPE</u>	<u>MANUFACTURE</u>	<u>MODEL</u>	<u>CAL. DATE</u>
EMI Test Receiver	Rohde & Schwarz	ESH3	2001.6.29
EMI Test Receiver	Rohde & Schwarz	ESVP	2001.2.14
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.11.5
EMI Test Receiver	Rohde & Schwarz	ESVS30	2001.3.6
Spectrum Monitor	Rohde & Schwarz	EZM	N.A
Graphic Plotter	Rohde & Schwarz	DOP2	N.A
Printer	Rohde & Schwarz	PDN	N.A
Spectrum Analyzer	H.P	8591EM	2001.7.11
LISN	EMCO	3825/2	2001.2.7
LISN	Rohde & Schwarz	ESH2-Z5	2001.8.12
Amplifier	Hewlett-Packard	8447E	2001.3.2
Dipole Antennas	Rohde & Schwarz	VHAP	2001.6.28
Dipole Antennas	Rohde & Schwarz	UHAP	2001.6.28
Biconical Antenna	Rohde & Schwarz	BBA-9106	2001.6.28
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2001.6.26
Antenna Position Tower	EMCO	1051-12	N.A
Turn Table	EMCO	1060-06	N.A
Line Filter	KEENE	ULW 2X30-60	N.A
Power Analyzer	Voltech	PM 3300	2001.2.20
Reference Network Impedance	Voltech	IEC 555	N.A
AC Power Source	PACIFIC	Magnetic Module	N.A
AC Power Source	PACIFIC	360AMX	N.A