MEASUREMENT/TECHNICAL REPORT

HYUNDAI ELECTRONICS INDUSTRIES CO.,LTD.

MODEL : HLM-1400

This report concerns(check one) : Original grant__X__ Class II change_____

Equipment type : LCD MONITOR

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____no__X__

If yes, defer until: _____

_____ agrees to notify the Commission by _____

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? yes_____ no__X__

If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-91 Edition] provision.

Report prepared by : KI SOO, KIM - Assistant Manager of QA Office

Company : HYUNDAI ELECTRONICS INDUSTRIES CO., LTD.
Address : SAN 136-1, AMI-RI, BUBAL-EUB, ICHON-SI, KYOUNGKI-DO, KOREA
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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Electronics Industries Co., Ltd. Model HLM-1400(refered to as the EUT in the this report) is a 14.1" LCD Monitor HOR. Freq. 60KHz w/max. Resolution of 1024 × 768 Non-Interlaced.

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)	6.0MHz
CHIPSET BRAND AND PART NO.	MOTOROLA (MC13282EP) MOTOROLA (XC141544DW) MOTOROLA (MC68HC705BD9P) SONY (CXA3106Q)
POWER REQUIREMENT (AC/DC Adapter)	Input Voltage : 90-264Vac, 50/60Hz Input Current : Max 1.5A(Vin : 90Vac,50Hz) Inrush Current : 15Apeak(At 115Vac Max.Load) 30Apeak(At 230Vac Max.Load) Output Voltage : 18Vdc(At 115Vac/230Vac Max.Load) Output Current : 2.5Adc(Max.Load) Full Power Limit : 3.0/ 5.0Vdc(At 115Vac/230Vac)
NUMBER OF LAYERS	MAIN interface BOARD 1 LAYER AC/DC BOARD 1 LAYER DC/DC BOARD 1 LAYER LCD DRIVER INTERFACE BOARD 1 LAYER INVERTER BOARD 1 LAYER OSD BOSRD 1
MAX. RESOLUTION	1024 X 768 NON-INTERLACED (@ 60KHz/75Hz)
H-SYNC FREQUENCY RANGE	31 KHz ~ 60 KHz
V-SYNC FREQUENCY RANGE	56 Hz ~ 85 Hz
LCD MODULE SIZE	14.1" (NEC / Type : NL10276AC28-01)
VIDEO CONNECTOR TYPE	D-SUB 15-PIN

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:

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
LCD MONITOR(EUT)	HYUNDAI	HLM-1400	CKLHLM-1400	HOST
ADAPTOR(EUT)	ILSAN ELECOM	ISA 50	-	HOST
PC(HOST)	H/P	HP BRIO 80XX	DoC	N/A
KEYBOARD	H/P	SK-2501-2D-K	DZL211029	HOST
PRINTER	H/P	C2168A	B94C2121X	HOST
MODEM	HYUNDAI	HMD-2404M	CKL8J7HMD-2404M	HOST
MOUSE	H/P	M-S34	GYUR38SK	HOST

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 3 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 on May 22, 1997 and accepted dated July 25,1997(1300F2)

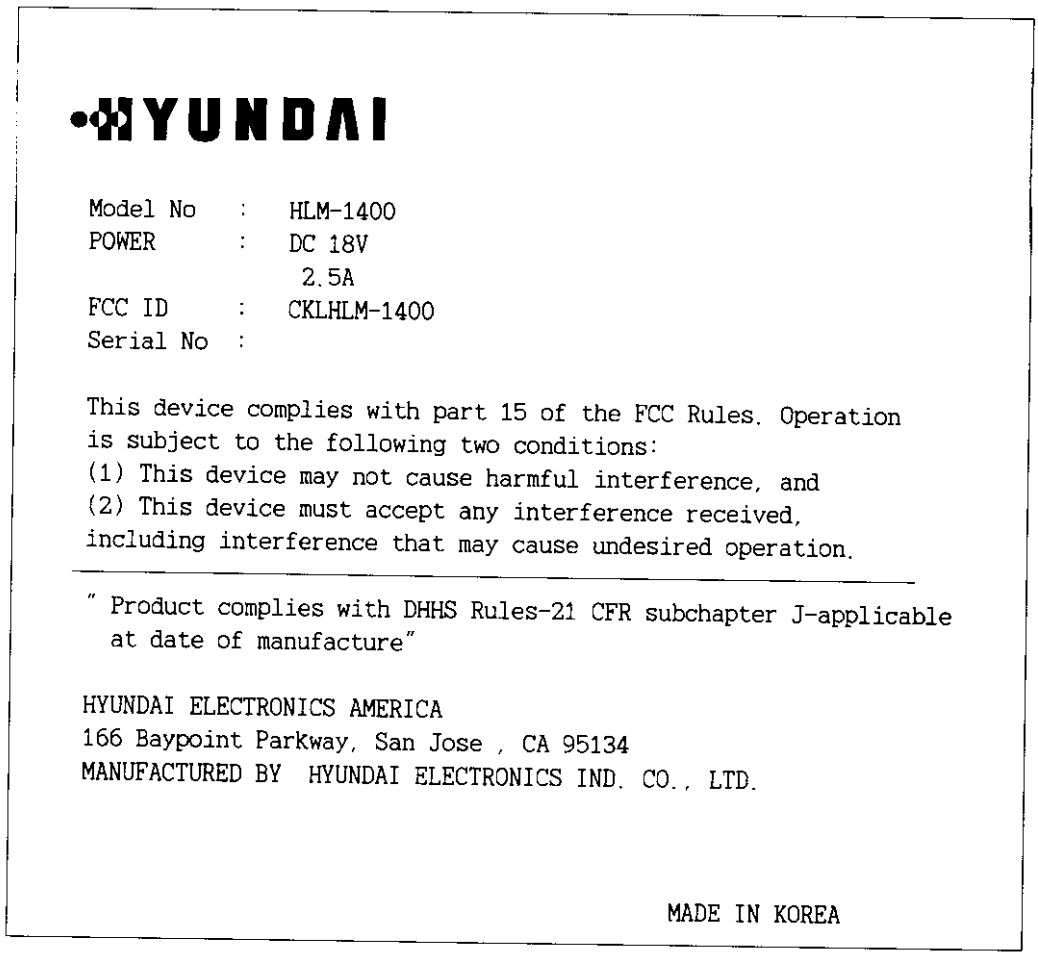
2. PRODUCT LABELLING AND USER INFORMATION

2.1 Product Label

Following is a copy of the label that will be placed on the rear side of the cabinet.

Figure 3.1 PRODUCT LABEL

Both the FCC ID and compliance statement are included in the product label



2.2 User Information

Attachment A is the user's guide for the HLM-1400 LCD MONITOR. The informations to the user required by the FCC rules section 15.21 and 15.105 are included in the front page of the manual.

3. SYSTEM TEST CONFIGURATION

3.1 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 INTERFACE BOARD	HYUNDAI	-
AC/DC BOARD	ILSAN ELECOM	-
DC/DC BOARD	GLOBEL TECHNIC	-
INVERTER BOARD	TDK	KU-03294-ON
LCD DRIVER INTERFACE BOARD	NEC	HY8583-01
OSD BOARD	HYUNDAI	-

3.2 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 key board 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.

3.5 Equipment Modifications

To achieve compliance to Class B levels, the following change was made during compliance testing :
This modification will be incorporated into unit sold under FCC ID : CKLHLM-1400

1. Add Filmac Bead at video input(R,G,B, V-Sync, H-Sync)

2. Add Bead-Resistor-Bead at Dot-clock output of PLL

3. Shield power cable between DC/DC and I/B(Main Interface Board).

Confirmation

We, hyundai electronics inderstris CO.Ltd.,will keep providing all production units in the above mentioned notice.

Signature

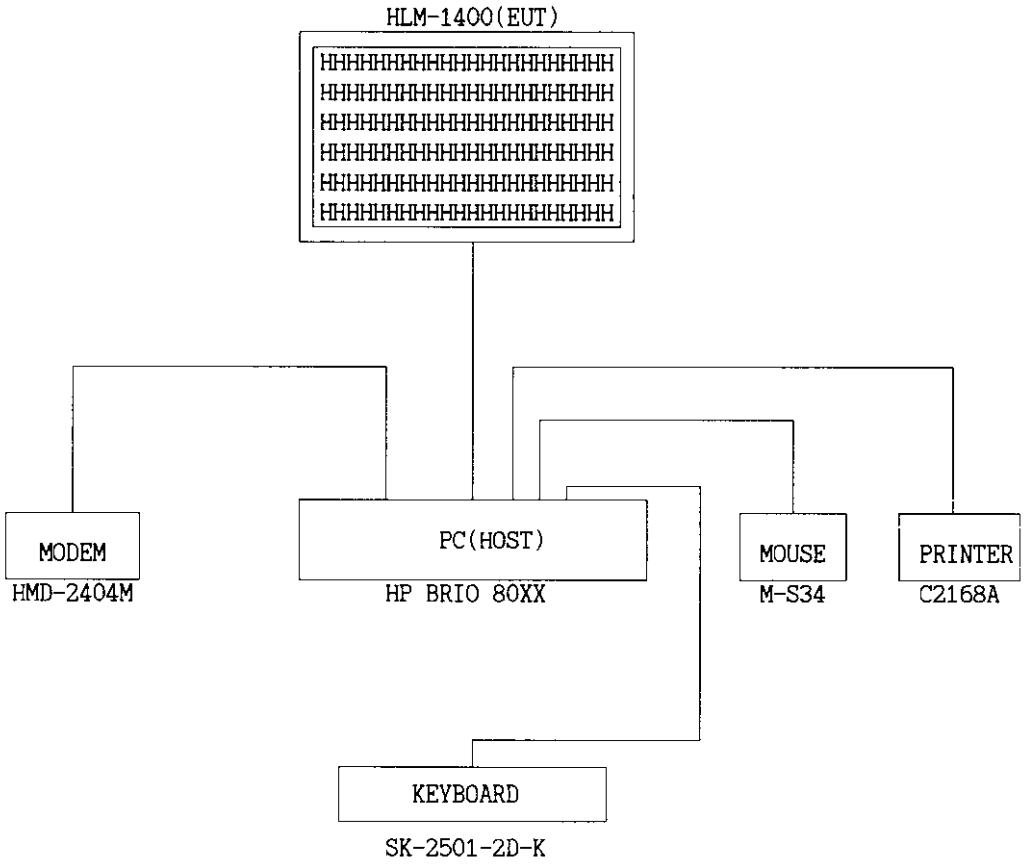
Jang Oh, Lee - General manager of R & D Department.-Name/Title
Monitor Division

3.6 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN.
Preliminary Powerline 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 conditions. Final Radiated Amission tests were conducted at 3 meter open area test site.

[Configuration of Tested System]



4. PRELIMINARY TESTS

4.1 AC Powerline Conducted Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 75 MHz	1024 × 768 Non-Interlaced (60.0KHz/75Hz)	X
Pentium 75 MHz	800 × 600 Non-Interlaced(46.8KHz/75Hz)	
Pentium 75 MHz	640 × 480 Non-Interlaced(37.5KHz/75Hz)	
Pentium 75 MHz	720 × 400 Non-Interlaced(37.9KHz/85Hz)	

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 75 MHz	1024 × 768 Non-Interlaced (60.0KHz/75Hz)	X
Pentium 75 MHz	800 × 600 Non-Interlaced(46.8KHz/75Hz)	
Pentium 75 MHz	640 × 480 Non-Interlaced(37.5KHz/75Hz)	
Pentium 75 MHz	720 × 400 Non-Interlaced(37.9KHz/85Hz)	

Tested by Sang Jun, Lee Date : May. 23, 1998

7. FINAL CONDUCETD AND RADIATED EMISSION TESTS SUMMARY

7.1 Conducted Emissions Tests

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

Humidity Level : 25% Temperature : 22 ℃
Limit apply to : FCC CFR 47, PART 15, SUBPART B
Type of Tests : CLASS B
Date : May. 25, 1998
Result : PASSED BY 19.0 dB

EUT : 14.1" LCD MONITOR
Operating Condition : 1024 × 768 Non-Interlaced (Hf : 60.0KHz, Vf : 75Hz)
Detector : CISPR Quasi-Peak (6 dB Bandwidth : 9 KHz)

Power Line Conducted Emissions			FCC Class B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuv)	Margin (dB)
0.450	26.3	NEUTRAL	48	-21.7
0.457	29.0	HOT	48	-19.0
0.470	28.9	HOT	48	-19.1
15.790	25.2	NEUTRAL	48	-22.8
25.540	25.0	NEUTRAL	48	-23.0
29.780	22.4	NEUTRAL	48	-25.6
29.950	22.5	NEUTRAL	48	-25.5

Line Conducted Emissions Tabulated Data

Sang Jun, Lee

Measured by : Sang Jun, Lee / Engineer

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RFI Voltage Test

E.u.T.: HLM-1400
Oper. condition: 1204*768 (Hf=60KHz , Vf=75Hz)
Test spec:
FCC PART 15 SUBPART B CLASS B

Exceeding values on phase: N

Frequency MHz	Peak dBuV	Q-Peak dBuV	QP-Margin dB
0.4500	32.5	26.0	-22.0
0.4508	32.0	25.5	-22.5
0.4516	31.5	24.7	-23.3
0.4524	29.6	23.6	-24.4
0.4532	28.2	22.0	-26.0
0.4540	26.7	19.6	-28.4
0.4566	33.4	28.6	-19.4
0.4575	31.1	29.0	-19.0
0.4584	31.9	29.1	-18.9
0.4593	32.8	29.1	-18.9
0.4702	33.1	28.9	-19.1
0.4711	33.1	28.8	-19.2
0.4720	33.1	28.1	-19.9
0.4729	32.5	27.2	-20.8
0.4738	32.7	25.1	-22.9
0.4747	31.6	20.6	-27.5
0.4756	30.6	14.7	-33.3
0.4765	27.9	9.5	-38.5
0.5605	25.5	21.8	-26.2
0.5615	25.7	22.6	-25.4
0.5635	26.0	22.9	-25.1
0.5646	25.9	22.7	-25.3
0.5657	26.0	22.0	-26.0
0.5668	26.5	20.9	-27.1
0.5679	27.1	20.4	-27.6
0.5689	26.1	19.2	-28.8
0.5701	25.5	16.4	-31.6
0.5712	25.7	13.6	-34.4
0.7190	26.6	20.0	-28.0
15.7300	27.9	22.7	-25.3
25.6000	25.8	22.3	-25.7
27.0500	25.7	18.1	-29.9
28.1800	25.6	14.2	-33.8
29.0300	25.7	15.1	-32.9
29.5000	27.6	16.4	-31.6
29.5900	26.9	16.0	-32.0
29.7700	26.4	19.2	-28.8
29.8700	25.6	16.2	-32.8
29.9600	25.9	16.2	-31.8

* Limit exceeded

POWER LINE POLARITY : HOT

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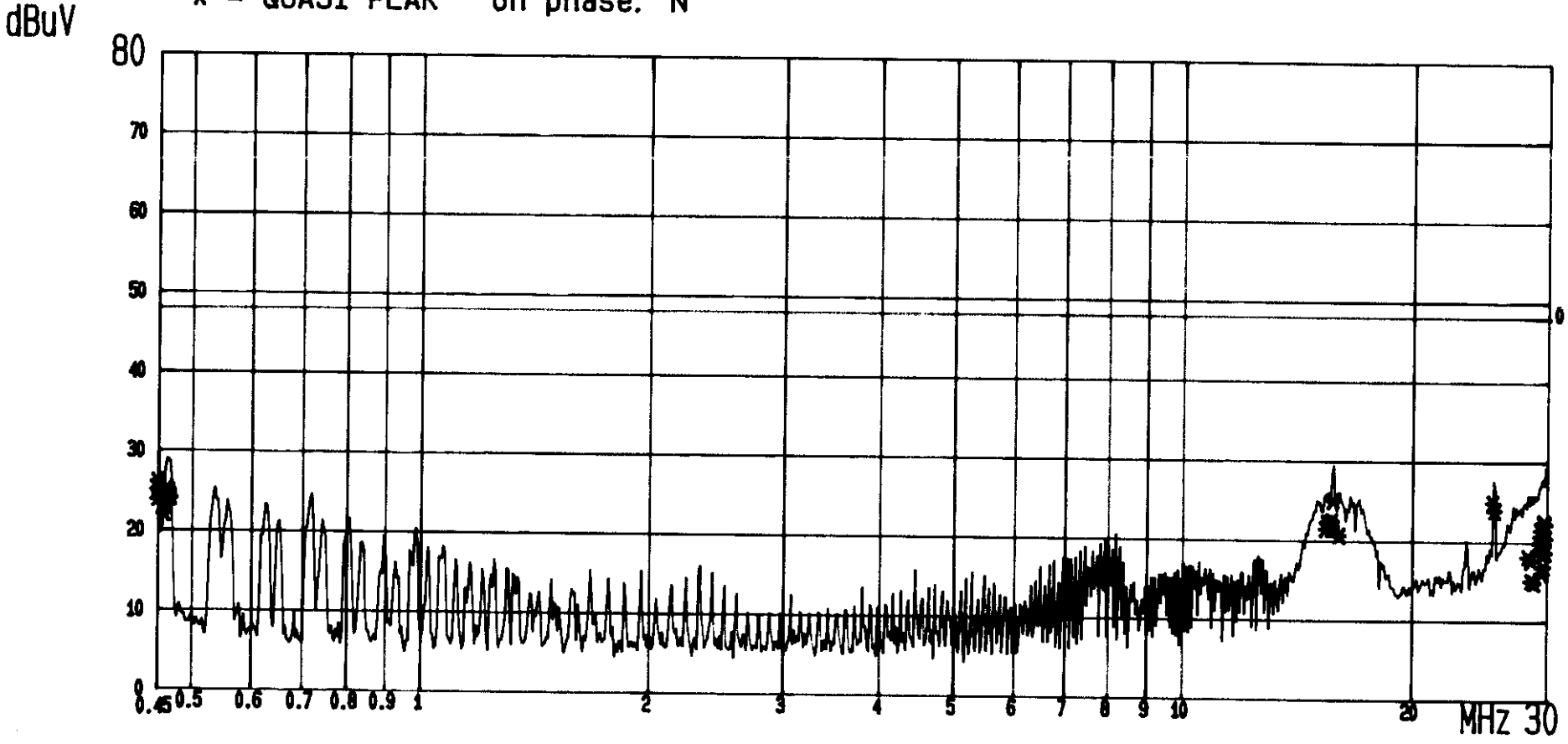
RFI Voltage Test

E.u.T.: HLM-1400
Oper. condition: 1024*768 (Hf=60.0KHz , Vf=75Hz)
Test spec:
FCC PART 15 SUBPART B CLASS B

Start Fr. MHz	Stop Fr. MHz	IF-BW kHz	Detector	Att. dB	Meas.T. s	Transd. type
0.4500	5.0000	10	Peak	LN	0.020	
5.0000	30.0000	10	Peak	LN	0.010	

Final evaluation: Quasi Peak
* = QUASI PEAK on phase: N



POWER LINE POLARITY : NEUTRAL

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RFI Voltage Test

E.u.T.: HLM-1400
Oper. condition: 1024*768 (Hf=60.0KHz , Vf=75Hz)
Test spec:
FCC PART 15 SUBPART B CLASS B

Exceeding values on phase: N

Frequency MHz	Peak dBuV	Q-Peak dBuV	QP-Margin dB
0.4500	29.6	26.3	-21.7
0.4508	29.4	25.3	-22.7
0.4516	27.6	24.1	-23.9
0.4596	26.1	22.2	-25.8
0.4604	26.8	23.5	-24.5
0.4612	27.7	24.3	-23.7
0.4621	28.5	24.9	-23.1
0.4630	28.7	25.3	-22.7
0.4639	28.7	26.4	-22.6
0.4648	29.2	25.3	-22.7
0.4657	28.9	25.1	-22.9
0.4666	29.0	24.8	-23.2
0.4675	28.7	24.2	-23.8
15.4200	26.1	21.7	-26.3
15.5100	26.1	22.5	-25.5
15.7000	26.4	22.1	-25.9
15.7200	26.8	21.7	-26.3
15.7300	26.7	22.7	-25.3
15.7900	29.7	25.2	-22.8
16.0700	26.3	20.9	-27.1
25.5400	27.9	25.0	-23.0
25.6000	26.8	24.1	-23.9
28.4700	26.1	18.2	-29.8
28.6600	26.0	15.3	-32.7
28.7500	26.1	17.9	-30.1
28.9400	26.1	15.0	-33.0
29.4000	26.9	20.1	-27.9
29.4900	27.2	21.7	-26.3
29.5900	26.3	18.6	-29.4
29.6700	26.0	21.7	-26.3
29.6800	26.9	20.8	-27.2
29.6900	26.7	16.3	-31.7
29.7700	26.9	22.4	-25.6
29.7800	27.2	17.1	-30.9
29.8500	27.1	20.1	-27.9
29.8600	26.9	22.7	-25.3
29.8700	29.5	18.8	-29.2
29.9500	26.3	22.5	-25.5
29.9600	27.6	20.6	-27.4

* Limit exceeded

POWER LINE POLARITY : NEUTRAL

7.2 Radiated Emissions Tests

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

Humidity Level : 20 % Temperature : 19 ℃
Limit apply to : FCC CFR 47, PART 15, SUBPART B
Type of Tests : CLASS B
Date : May. 25, 1998
Result : PASSED BY 4.0 dB

EUT : 14.1″ LCD MONITOR
Operating Condition : 1024 × 768 Non-Interlaced (Hf : 60.0KHz, Vf : 75Hz)
Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Radiated Emissions		Ant.	Correction Factors	Total	FCC Class B	
Freq. (MHz)	Ampl. (dBuV)	Pol.	Antenna & Cable Loss (dB/m)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
37.0	15.5	V	16.0	31.5	40.0	-8.5
41.5	19.3	V	14.5	33.8	40.0	-6.2
142.3	19.8	H	15.9	35.7	43.5	-7.8
157.3	19.8	V	17.2	37.0	43.5	-6.5
210.3	14.5	H	20.3	34.8	43.5	-8.7
275.4	20.9	V	21.1	42.0	46.0	-4.0
314.7	20.2	V	18.7	38.9	46.0	-7.1
384.0	18.6	V	20.1	38.7	46.0	-7.3
393.4	19.7	H	20.3	40.0	46.0	-6.0
472.1	19.8	V	21.7	41.5	46.0	-4.5
511.4	16.5	V	22.3	38.8	46.0	-7.2
590.1	15.1	V	23.6	38.7	46.0	-7.3
629.5	17.7	H	24.3	42.0	46.0	-4.0
786.9	13.2	H	26.8	40.0	46.0	-6.0
865.6	12.9	H	28.1	41.0	46.0	-5.0
944.2	9.6	H	29.4	39.0	46.0	-7.0

Sang Jun, Lee

Measured by : Sang Jun, Lee / Engineer

7. 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 dBuV/m

Level in uV/m = Common Antilogarithm [(30 dBuV/m)/20] = 31.6 uV/m

8. PHOTO REPORT

The photos of EUT are attached on the following pages: