

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
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CERTIFICATION

Manufacture;

HYUNDAI IMAGE QUEST CO., LTD.
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI,
KYOUNKI-DO, 467-701, KOREA

Date of Issue: JUNE 26, 2001

Test Report No.: HCT-F01-0602

**Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.**

FCC ID :

PJIL15A0C061

MODEL / TYPE :

L550

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

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 GTech. 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



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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Image Quest CO., LTD. Model L550 (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)	16MHz , 14.3181MHz , 12MHz
POWER REQUIREMENT	100-240 VAC 50/60 Hz, 1.5A
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 1 LAYER POWER BOARD 1 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1024X768 (@60KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31KHz 60KHz
V-SYNC FREQUENCY RANGE	44Hz 75Hz
LCD TYPE	15" (LCD Type : HT15X11-200)

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
MONITOR (EUT)	HYUNDAI IMAGE QUEST CO., LTD.	L550	PJIL15A0C061	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	M-S34	DZL211029	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 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	Hyundai Image Quest CO., Ltd.	304100103003
POWER BOARD	C&C TECH.	3610200093
OSD BOARD	Hyundai Image Quest CO., Ltd.	-
INVERTOR BOARD	Green C&C TECH.	361040024301
LCD BOARD	Hynix Semiconductor Inc.	HT15X11-200

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

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

	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)

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

2.5 Equipment Modifications

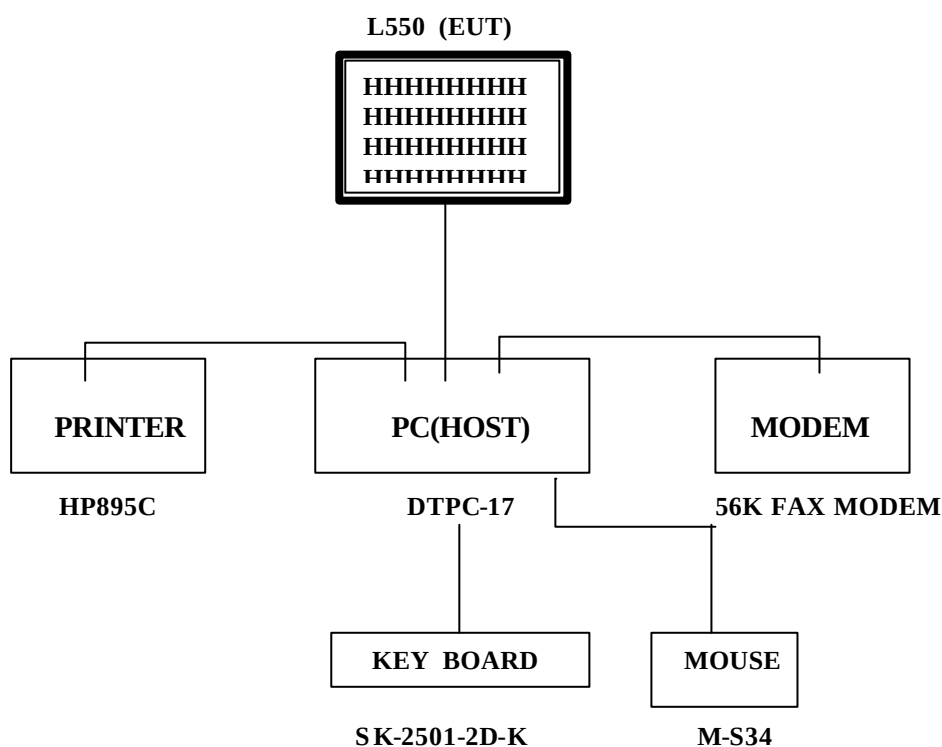
N/A

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/60 Hz)	
	1024X768 (56.5KHz/70 Hz)	
	720X400 (31.5KHz/70Hz)	
	800 x 600 (46.7 KHz/75Hz)	
	640 x 480 (31.5KHz/60 Hz)	

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/75 Hz)	X
	1024X768 (48.4KHz/60 Hz)	
	1024X768 (56.5KHz/70 Hz)	
	720X400 (31.5KHz/70Hz)	
	800 x 600 (46.7 KHz/75Hz)	
	640 x 480 (31.5KHz/60Hz)	

Tested by Kyoung-Houn SEO / Engineer

Date : JUNE 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	: 35%	Temperature	: 28
Limit apply to	: CISPR 22		
Type of Tests	: CLASS B		
Date	: JUNE 8, 2001		
Result	: PASSED BY 12.2 dB		
EUT	: 15" LCD MONITOR		

Operating Condition : 1024X768 (Hf : 60 KHz, Vf : 75 Hz)
 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
2.985	41.20	NEUTRAL	56.0	14.8	Quasi-Peak
3.035	33.80	NEUTRAL	46.0	12.2	Average
2.905	38.70	HOT	56.0	17.3	Quasi-Peak
2.780	28.50	HOT	46.0	17.5	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

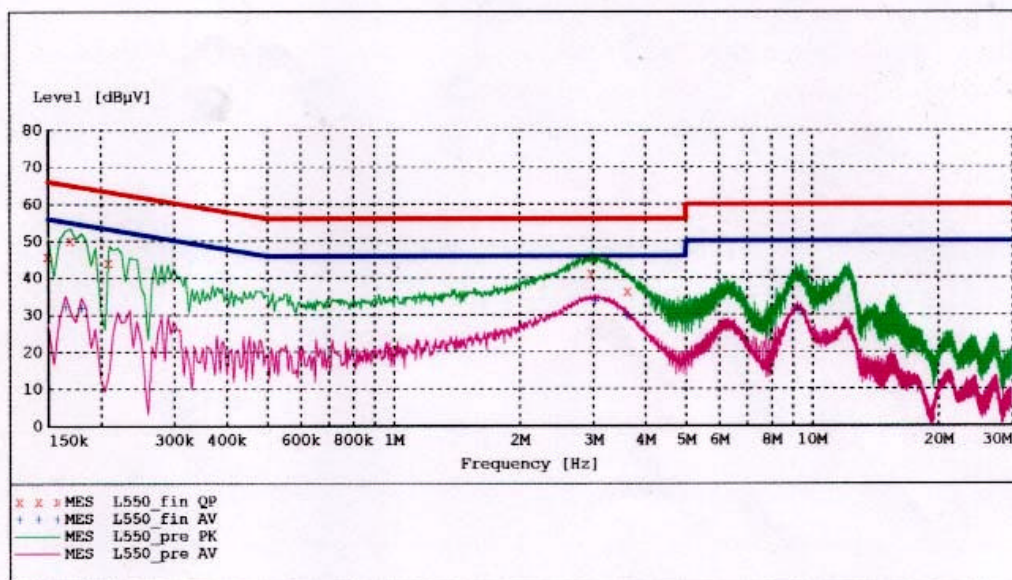
Date : JUNE 8 , 2001

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

EUT: L550
Manufacturer: HYUNDAI NETWORKS
Operating Condition: 1024 X 768 75Hz
Test Site: Shield Room
Operator: Kyoung-Houn Seo
Test Specification: CISPR 22 Class B
Comment: N[110]
Start of Test: 6/8/01 / 12:15:23PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:		EN 55022 Voltage				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	2.0 MHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			
2.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			

**MEASUREMENT RESULT: "L550_fin QP"**

6/8/01 12:17PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.150000	45.90	0.5	66	20.1	1	---
0.170000	50.20	0.5	65	14.8	1	---
0.210000	44.20	0.5	63	19.0	1	---
2.985000	41.20	0.6	56	14.8	1	---
3.630000	36.40	0.7	56	19.6	1	---

MEASUREMENT RESULT: "L550_fin AV"

6/8/01 12:17PM

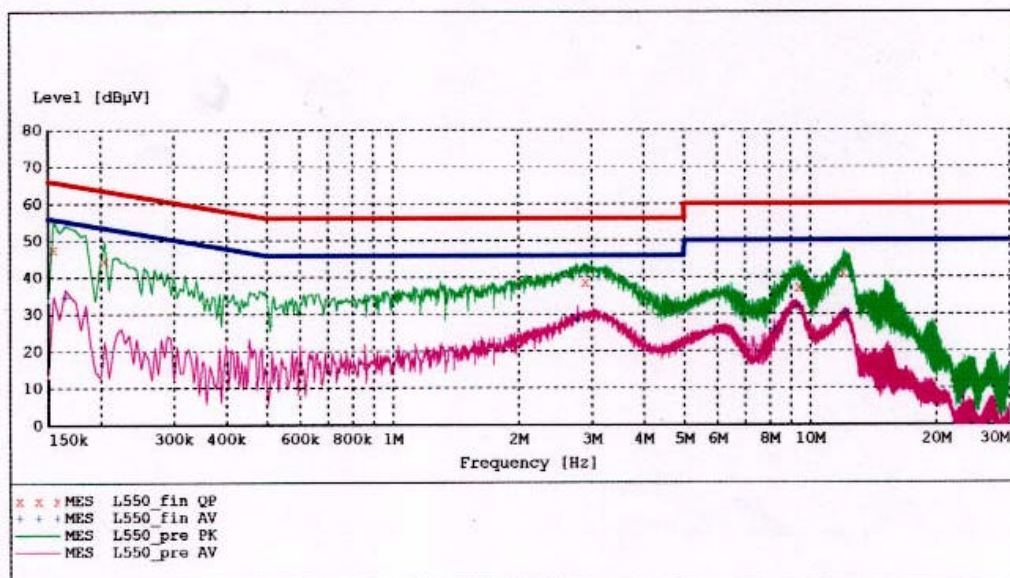
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.165000	32.30	0.5	55	22.9	1	---
0.180000	31.90	0.5	55	22.5	1	---
3.035000	33.80	0.6	46	12.2	1	---
3.630000	29.60	0.7	46	16.4	1	---
9.235000	31.40	1.2	50	18.6	1	---

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

EUT: L550
Manufacturer: HYUNDAI NETWORKS
Operating Condition: 1024 X 768 75Hz
Test Site: Shield Room
Operator: Kyoung-Houn Seo
Test Specification: CISPR 22 Class B
Comment: H[110]
Start of Test: 6/8/01 / 12:12:24PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:	EN 55022 Voltage					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	2.0 MHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			
2.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			

**MEASUREMENT RESULT: "L550_fin QP"**

6/8/01 12:14PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.155000	47.60	0.5	66	18.1	1	---
0.205000	44.50	0.5	63	19.0	1	---
2.905000	38.70	0.6	56	17.3	1	---
9.445000	37.20	1.2	60	22.8	1	---
12.065000	41.10	1.4	60	18.9	1	---

MEASUREMENT RESULT: "L550_fin AV"

6/8/01 12:14PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.165000	34.70	0.5	55	20.5	1	---
2.780000	28.50	0.6	46	17.5	1	---
8.240000	26.10	1.2	50	23.9	1	---
9.300000	31.90	1.2	50	18.1	1	---
12.200000	30.10	1.4	50	19.9	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 : 33 % Temperature : 24
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JUNE 12, 2001
 Result : PASSED BY 4.0 dB

=====

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 dB	Margin dB
54.3	14.41	9.49	1.50	V	25.4	30.0	4.6
54.3	10.51	9.49	1.50	H	21.5	30.0	8.5
62.4	17.45	6.85	1.70	V	26.0	30.0	4.0
62.4	12.35	6.85	1.70	H	20.9	30.0	9.1
117.1	7.46	12.84	2.30	H	22.6	30.0	7.4
132.6	6.39	14.21	2.50	H	23.1	30.0	6.9
140.7	8.13	14.57	2.50	H	25.2	30.0	4.8
172.7	8.09	15.01	2.70	H	25.8	30.0	4.2
403.3	6.95	16.55	4.20	H	27.7	37.0	9.3
434.8	6.92	17.08	4.50	V	28.5	37.0	8.5
434.8	9.12	17.08	4.50	H	30.7	37.0	6.3
475.0	6.27	18.03	4.80	V	29.1	37.0	7.9

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.
3. The EUT was test up to 2GHz and no significant emission was found.

Measured by Kyoung-Houn SEO / Engineer

Date : JUNE 12, 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	2000.6.29
EMI Test Receiver	Rohde & Schwarz	ESVP	2001.2.14
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.1.18
EMI Test Receiver	Rohde & Schwarz	ESVS30	2000.6.29
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	2000.7.11
LISN	EMCO	3825/2	2000.10.13
LISN	Rohde & Schwarz	ESH2-Z5	2000.7.14
Amplifier	Hewlett-Packard	8447E	2001.3.2
Dipole Antennas	Rohde & Schwarz	VHAP	2000.6.29
Dipole Antennas	Rohde & Schwarz	UHAP	2000.6.29
Biconical Antenna	Rohde & Schwarz	BBA-9106	2000.6.29
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2000.6.29
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	2000.12.20
Reference Network Impedance	Voltech	IEC 555	N.A
AC Power Source	PACIFIC	Magnetic Module	N.A
AC Power Source	PACIFIC	360AMX	N.A