

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;

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

Date of Issue: SEPTEMBER 13, 2001

Test Report No.: HCT-F01-0904

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

FCC ID :

PJIL17C0D080

MODEL / TYPE :

L70A/L17C0D080

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:

17" LCD Monitor

Max Resolution:

1280X1024 (@80KHz/ 75Hz)

Port/ Connector(s)

15-pin D-sub VGA connector, 20-pin DVI-D (Digital RGB)

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



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1. GENERAL INFORMATION

1.1 Product Description

The ImageQuest CO., LTD. Model L70A (referred to as the EUT in this report) is a 17" LCD Monitor HOR. Freq. 80KHz w/max. Resolution of 1280X1024 . 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 , 16MHz , 20MHz
POWER REQUIREMENT	DC 12V ---- 3.75A
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 2 LAYER POWER BOARD 2 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1280X1024 (@80KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31.0KHz 80.0KHz
V-SYNC FREQUENCY RANGE	56Hz 75Hz
LCD TYPE	17" (LCD Type NO : HT17E11-200)

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)	IMAGEQUEST CO., LTD.	L70A	PJIL17C0D080	HOST
PC(HOST)	COMPAQ	PD1000	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	ATI TECHNOLOGIES INC.	RADEON 32M	DoC	HOST
MOUSE	H/P	M-S34	DZL211029	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.	3041001038
POWER BOARD	ImageQuest CO., Ltd	3610200099
OSD BOARD	ImageQuest CO., Ltd.	3100700778
INVERTOR BOARD	ImageQuest CO., Ltd	3610400245
LCD BOARD	Hyundai Display Technology	HT17E11-200

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

	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
MONITOR(EUT)	N	Y	1.8(P), 1.5(D), 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)
USB MOUSE	N/A	Y	0.8(D)
USB FRESH DRIVE	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
USB MOUSE	N	N/A	Y	EUT END
USB FRESH DRIVE	N	N/A	Y	EUT END

2.5 Equipment Modifications

N/A

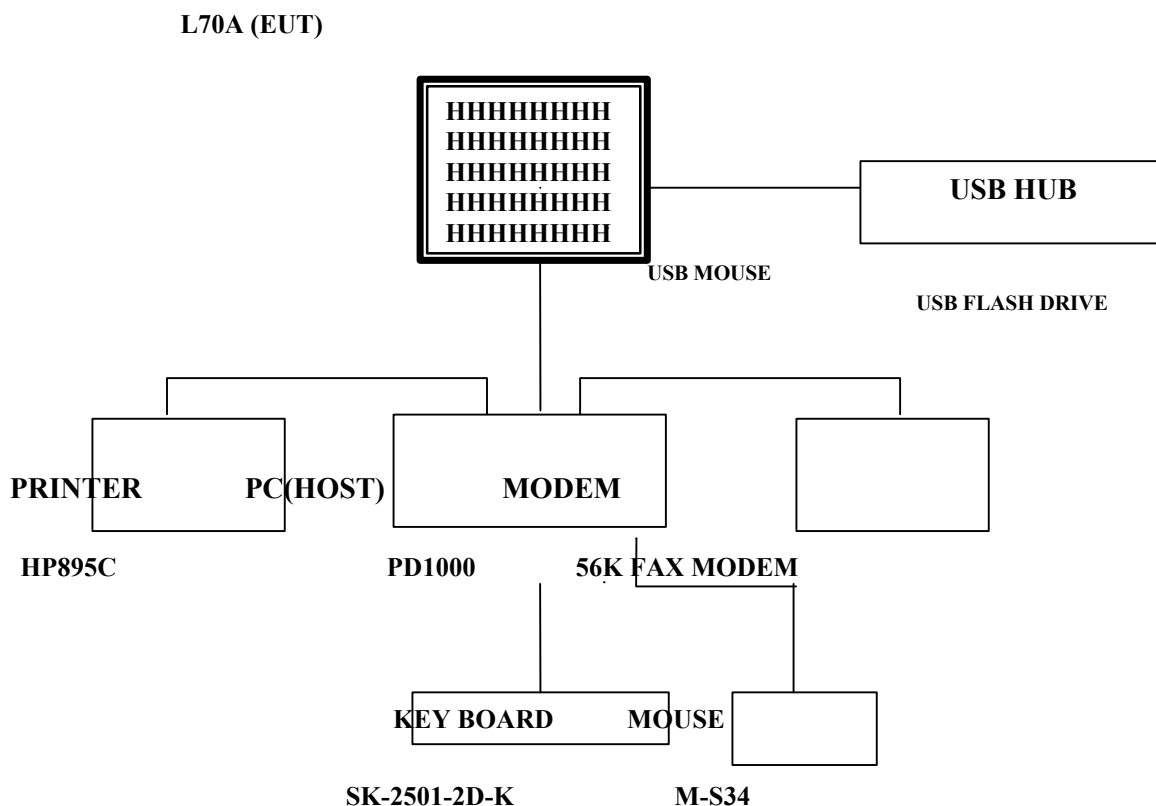
2.6 Configuration of Test system

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	1280X1024 (80KHz/75Hz)	X
	1024X768 (60KHz/75Hz)	
	1024X768 (56.5KHz/70Hz)	
	800X600 (37.9KHz/60Hz)	
	800X600 (35.2 KHz/56Hz)	
	640X480 (31.5KHz/70Hz)	

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	1280X1024 (80KHz/75Hz)	X
	1024X768 (60KHz/75Hz)	
	1024X768 (56.5KHz/70Hz)	
	800X600 (37.9KHz/60Hz)	
	800X600 (35.2 KHz/56Hz)	
	640X480 (31.5KHz/70Hz)	

NOTE:

The monitor(EUT) has video interface ports{15-pin D-sub VGA connector, 20-pin DVI-D (Digital RGB)} to support two kinds of graphics adapters.

So the test were performed with each video interface port. The final measurement was performed with VGA 15 pin D-sub video interface port that produce the worst case emission.

Tested by Kyoung-Houn SEO / Engineer

Date : AUGUST 23 , 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 : 25
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : SEPTEMBER 3 , 2001
 Result : PASSED BY -13.7 dB
 EUT : 17" LCD MONITOR

Operating Condition : 1280X1024 (Hf : 80KHz, 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
24.000	36.30	NEUTRAL	50.0	-13.7	Average
24.000	36.20	HOT	50.0	-13.8	Average
1.120	28.60	HOT	46.0	-17.4	Average
1.120	26.70	NEUTRAL	46.0	-19.3	Average

Measured by : Kyoung-Houn SEO / Engineer

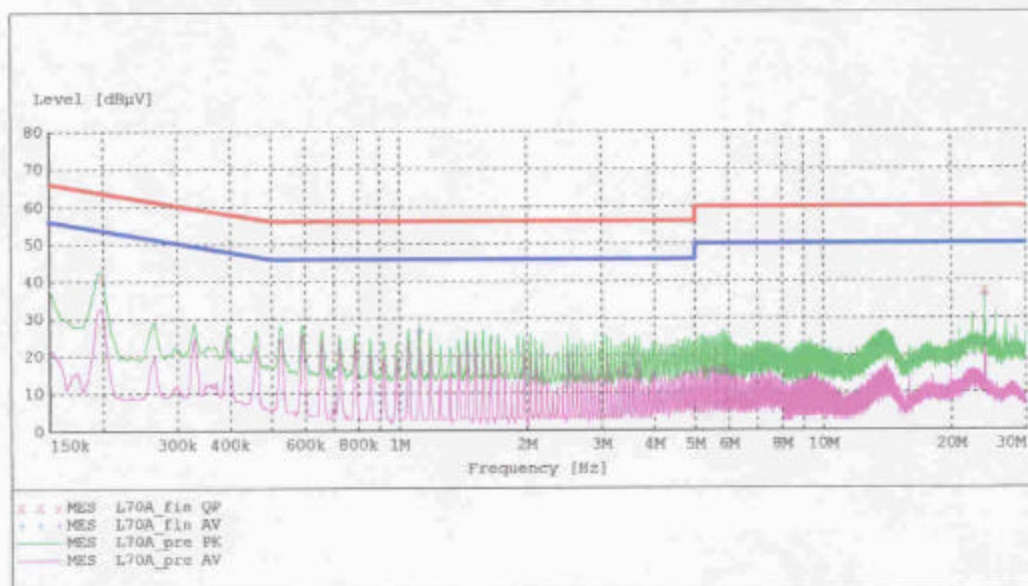
Date : SEPTEMBER 3 , 2001

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

EUT: L70A
 Manufacturer:
 Operating Condition:
 Test Site: Shield Room
 Operator:
 Test Specification: EN55022 Class B
 Comment: N
 Start of Test: 9/3/01 / 11:10:41AM

SCAN TABLE: "EN 55022 Voltage"

Short Description:			EN 55022 Voltage				Transducer
Start	Stop	Step	Detector	Meas. Time	IF Bandw.		
Frequency 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: "L70A_fin QP"

9/3/01 11:13AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.200000	41.20	0.5	64	22.4	1	---
24.000000	37.20	2.0	60	22.8	1	---

MEASUREMENT RESULT: "L70A_fin AV"

9/3/01 11:13AM

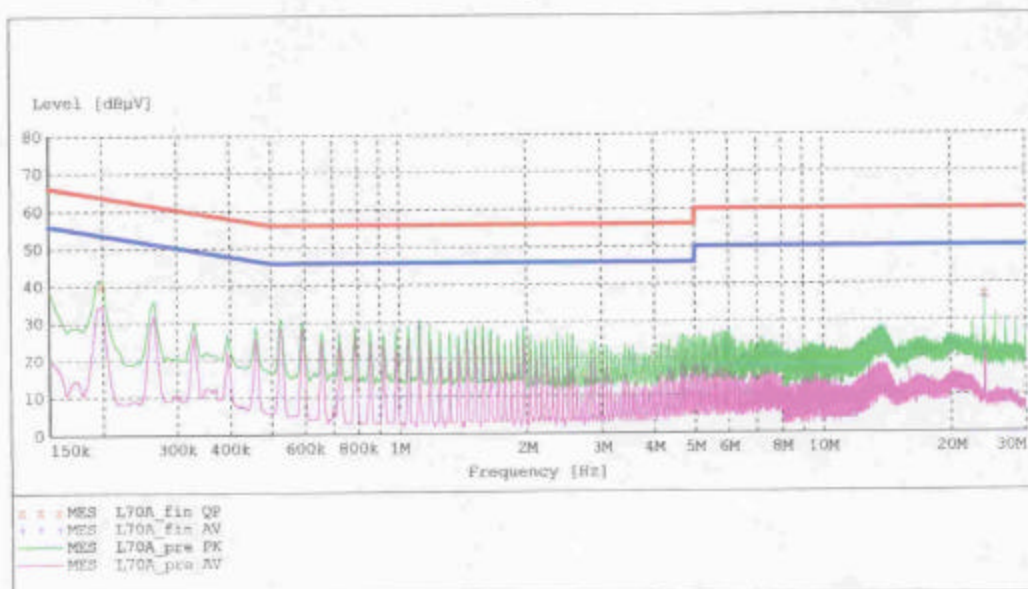
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.120000	26.70	0.5	46	19.3	1	---
24.000000	36.30	2.0	50	13.7	1	---

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

EUT: L70A
 Manufacturer:
 Operating Condition:
 Test Site: Shield Room
 Operator:
 Test Specification: EN55022 Class B
 Comment: H
 Start of Test: 9/3/01 / 11:15:11AM

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: "L70A_fin QP"

9/3/01 11:18AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.200000	40.30	0.5	64	23.3	1	---
24.000000	37.00	2.0	60	23.0	1	---

MEASUREMENT RESULT: "L70A_fin AV"

9/3/01 11:18AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.120000	28.60	0.5	46	17.4	1	---
24.000000	36.20	2.0	50	13.8	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 : 35 % Temperature : 25

Limit apply to : CISPR 22

Type of Tests : CLASS B

Date : AUGUST 30, 2001

Result : PASSED BY -3.5dB

EUT : 17" LCD MONITOR

Operating Condition : 1280X1024 (Hf :80 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
119.8	10.34	12.96	2.30	V	25.6	30.0	-4.4
128.6	6.16	13.84	2.40	H	22.4	30.0	-7.6
137.3	9.63	14.37	2.50	V	26.5	30.0	-3.5
145.4	5.65	14.65	2.50	H	22.8	30.0	-7.2
154.2	7.53	14.77	2.60	H	24.9	30.0	-5.1
403.3	4.55	16.55	4.20	H	25.3	37.0	-11.7
412.0	5.86	16.74	4.20	H	26.8	37.0	-10.2
469.3	7.33	17.97	4.80	H	30.1	37.0	-6.9
489.0	9.43	18.17	4.80	H	32.4	37.0	-4.6
513.5	7.71	18.79	5.00	V	31.5	37.0	-5.5
769.0	2.77	22.73	6.50	H	32.0	37.0	-5.0
853.0	0.57	23.23	6.90	V	30.7	37.0	-6.3

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 : AUGUST 30 , 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

TYPE	MANUFACTURE	MODEL	CAL.DATE	
EMI Test Receiver	Rohde & Schwarz	ESH3	2001.6.29	
EMI Test Receiver	Rohde & Schwarz	ESVP	2001.2.14	
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.1.18	
EMI Test Receiver	Rohde & Schwarz	ESVS30	2001.6.26	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	2001.7.13	
LISN	Rohde & Schwarz	ESH2-Z5	2001.7.14	
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	