

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

INT'L STANDARD CERTIFICATION TEAM
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA
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CERTIFICATION

Manufacture;

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

Date of Issue: JULY 10, 2001

Test Report No.: HCT-F01-0702

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

FCC ID :

PJIC17F15070

MODEL / TYPE :

Q770

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" CRT Monitor

Max Resolution:

1024 X 768 Non-interlaced (@68.7KHz/ 85Hz)

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 Q770 (referred to as the EUT in this report) is a 17" CRT Monitor with HOR. Freq. 70KHz (Max) and Resolution of 1024X768 (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. $\geq$ 1MHz)	12MHz
POWER REQUIREMENT	100 - 240 VAC 1.5A
NUMBER OF LAYERS	MAIN BOARD 1 LAYER CRT BOARD 1 LAYER
MAX. RESOLUTION	1024 X 768 NON-INTERLACED(@68.7KHz/ 85 Hz)
H-SYNC FREQUENCY RANGE	30KHz 70KHz
V-SYNC FREQUENCY RANGE	50Hz 150Hz
CRT TYPE	17" (CRT Type :M41QCJ761X173)

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.	Q770	PJIC17F15070	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..	3040100886
CRT BOARD	Hyundai Image Quest CO., Ltd.	3040100887

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	PC END	Y	PC 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

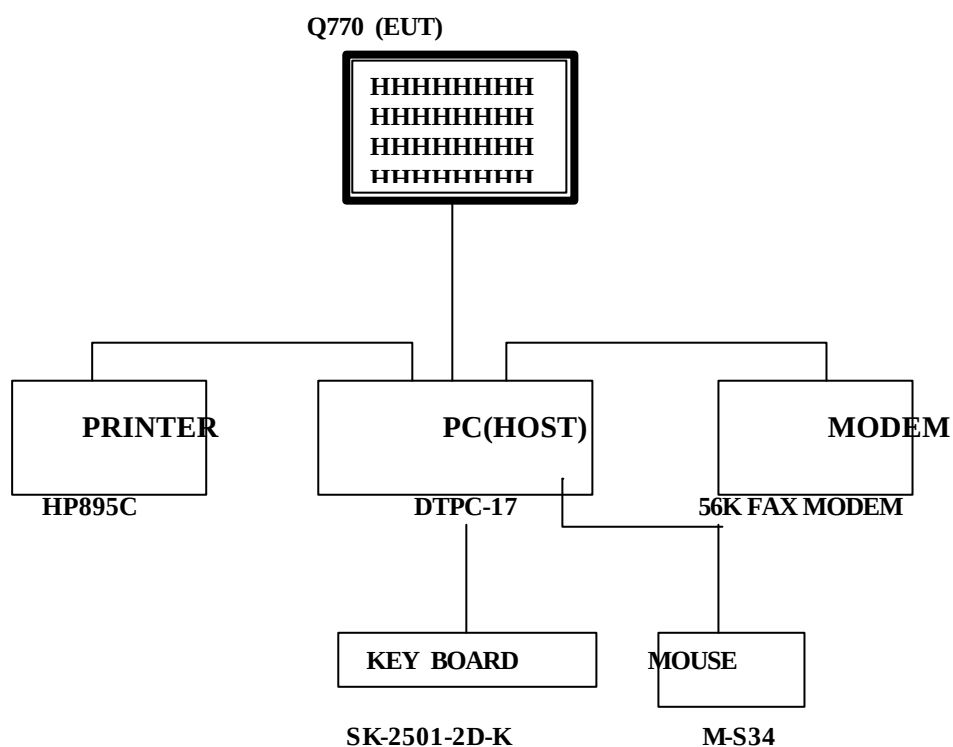
N/A

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 75 MHz	1280 x 1024 Non-Interlaced (63.99KHz/60Hz)	
Pentium 75 MHz	1024 x 768 Non-Interlaced (68.67KHz/85Hz)	X
Pentium 75 MHz	800 x 600 Non-Interlaced (63.70KHz/120Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (63.92KHz/100Hz)	
Pentium 75 MHz	640 x 480 Non-Interlaced (43.27KHz/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	1280 x 1024 Non-Interlaced (63.99KHz/60Hz)	
Pentium 75 MHz	1024 x 768 Non-Interlaced (68.67KHz/85Hz)	X
Pentium 75 MHz	800 x 600 Non-Interlaced (63.70KHz/120Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (63.92KHz/100Hz)	
Pentium 75 MHz	640 x 480 Non-Interlaced (43.27KHz/85Hz)	

Tested by Kyoung-Houn Seo / Engineer

Date : JUNE 12, 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 : 25 °C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JULY 5, 2001
 Result : PASSED BY -9.6 dB

EUT : 17" CRT MONITOR
 Operating Condition : 1024 X 768 Non-Interlaced (Hf : 68.7 KHz, Vf : 85Hz)
 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
13.09	46.80	NEUTRAL	60.0	-13.2	Quasi-Peak
13.15	46.40	NEUTRAL	60.0	-13.6	Quasi-Peak
0.895	36.40	HOT	46.0	-9.6	Average
1.595	36.30	NEUTRAL	46.0	-9.7	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 : JULY 5, 2001

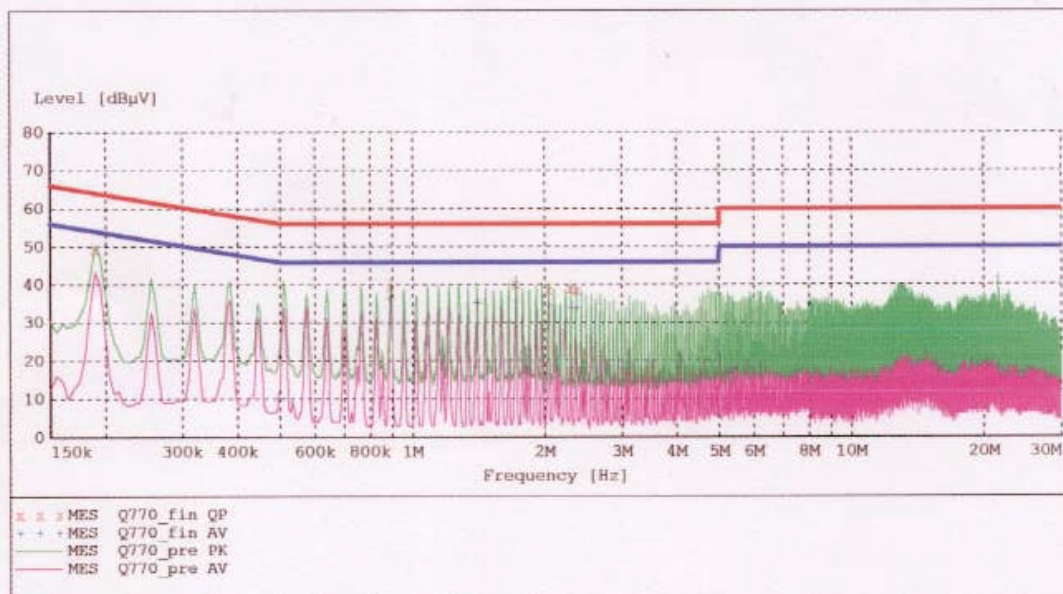
HYUNDAI C-TECH. CO., LTD.
EMC TEST LAB.

EUT: Q770
Manufacturer:
Operating Condition:
Test Site: Shield Room
Operator: Kyoung-Houn SEO
Test Specification: CISPR 22 Class B
Comment: H[110]
Start of Test: 7/5/01 / 9:54:23AM

SCAN TABLE: "EN 55022 Voltage"

Short Description:

Start Frequency	Stop Frequency	Step Width	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: "Q770_fin QP"**

7/5/01 9:57AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.190000	49.30	0.5	64	14.7	1	---
0.895000	39.40	0.5	56	16.6	1	---
1.725000	40.10	0.5	56	15.9	1	---
2.045000	38.60	0.6	56	17.4	1	---
2.300000	39.00	0.6	56	17.0	1	---
2.365000	38.40	0.6	56	17.6	1	---

MEASUREMENT RESULT: "Q770_fin AV"

7/5/01 9:57AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.895000	36.40	0.5	46	9.6	1	---
1.405000	35.30	0.5	46	10.7	1	---
1.725000	35.60	0.5	46	10.4	1	---
2.045000	34.50	0.6	46	11.5	1	---
2.300000	33.90	0.6	46	12.1	1	---
2.365000	33.80	0.6	46	12.2	1	---

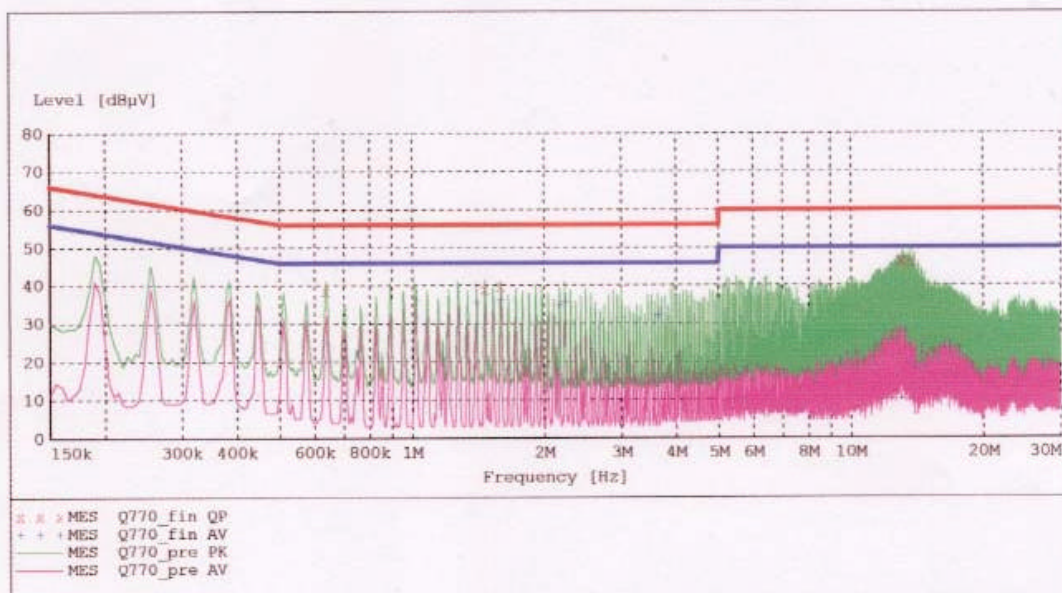
HYUNDAI C-TECH. CO., LTD.
EMC TEST LAB.

EUT: Q770
 Manufacturer:
 Operating Condition:
 Test Site: Shield Room
 Operator: Kyoung-Houn SEO
 Test Specification: CISPR 22 Class B
 Comment: N[110]
 Start of Test: 7/5/01 / 9:58:36AM

SCAN TABLE: "EN 55022 Voltage"

Short Description:

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


MEASUREMENT RESULT: "Q770_fin QP"

7/5/01 10:02AM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.640000	38.40	0.5	56	17.6	1	---
1.470000	39.00	0.5	56	17.0	1	---
1.595000	39.70	0.5	56	16.3	1	---
13.090000	46.80	1.4	60	13.2	1	---
13.155000	46.40	1.4	60	13.6	1	---
13.730000	46.00	1.5	60	14.0	1	---

MEASUREMENT RESULT: "Q770_fin AV"

7/5/01 10:02AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.020000	36.20	0.5	46	9.8	1	---
1.405000	35.60	0.5	46	10.4	1	---
1.595000	36.30	0.5	46	9.7	1	---
2.170000	34.90	0.6	46	11.1	1	---
2.235000	35.70	0.6	46	10.3	1	---
3.640000	32.30	0.7	46	13.7	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 : 30 % Temperature : 24 °C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JUNE 30, 2001
 Result : PASSED BY -4.1 dB

EUT : 17" CRT MONITOR

Operating Condition : 1024 X 768 Non-Interlaced (Hf : 68.7 kHz, Vf : 85 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
138.7	7.71	14.39	2.50	V	24.6	30.0	-5.4
142.1	8.69	14.61	2.50	V	25.8	30.0	-4.2
151.5	8.64	14.76	2.60	V	25.0	30.0	-5.0
170.4	7.23	14.97	2.70	H	24.9	30.0	-5.1
176.5	5.33	15.07	2.70	V	23.1	30.0	-6.9
195.6	7.36	15.54	3.00	V	25.9	30.0	-4.1
216.6	5.00	16.60	3.30	H	24.9	30.0	-5.1
403.3	11.75	16.55	4.20	H	32.5	37.0	-4.5
468.0	8.65	17.95	4.80	V	31.4	37.0	-5.6
522.3	7.68	18.92	5.10	V	31.7	37.0	-5.3
748.1	1.76	22.54	6.40	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 : JUNE 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	2001.6.26
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	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	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	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