

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

PRODUCT COMPLIANCE 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 IMAGEQUEST FRN : 0005-8664-39	Date of Issue: JUNE 3, 2002 Test Report No.: HCT-F02-0601 Test Site: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD. HCT FRN : 0005-8664-21
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FCC ID :

**PJIQ15
L15A0C060**

MODEL / TYPE :

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:	1024 X 768 (@60KHz/ 75Hz)
Port/ Connector(s)	15-pin D-sub VGA connector, USB 1 upstream port and 2 downstream ports
LCD PANEL	HannStar Display Corporation (HSD150MX12)
ADPTOR	C&C TECH CO.,LTD.

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 Q15 (referred to as the EUT in this report) is a 15" LCD Monitor HOR. Freq. 60KHz w/max. Resolution of 1024 X 768 . 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)	6MHz , 12MHz , 20MHz
POWER REQUIREMENT	DC 12V/5V $\overline{\text{---}}$ 2.0A / 2.0A
NUMBER OF LAYERS	MAIN BOARD 2 LAYER OSD BOARD 2 LAYER POWER BOARD 2 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1024 X 768 (@60KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31.0KHz ~ 60.0KHz
V-SYNC FREQUENCY RANGE	56Hz ~ 75Hz
LCD TYPE	15" (LCD Type NO : HSD150MX12)

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.	Q15	PJIQ15	HOST
PC(HOST)	H/P	KR14111606	DoC	N/A
KEY BOARD	H/P	BF12502086	DoC	HOST
PRINTER	H/P	HP895C	DoC	HOST
MODEM	3COM CORPORATION	56K FAX MODEM	DoC	HOST
VIDEO CARD	NVIDIA	NVIDIA GeForce MX 200	DoC	HOST
MOUSE	H/P	M-S48a	DoC	HOST
USB MOUSE	LOGITECH	M-BE55	DoC	EUT
USB FLASH DRIVE	Jung Myung Telecom Co.,Ltd	E-D900-00-4988	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	C&C TECH CO.,LTD.	361020008703
OSD BOARD	ImageQuest CO., Ltd.	3010700802
INVERTOR BOARD	ImageQuest CO., Ltd	3610400247
LCD BOARD	HannStar Display Corporation	HSD150MX12

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)
UPLOAD	N/A	Y	1.8(D)
USB MOUSE	N/A	N/A	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
UPLOAD	Y	BOTH END	Y	BOTH END
USB MOUSE	N	N/A	Y	EUT END
USB FRESH DRIVE	N	N/A	Y	EUT END

2.5 Equipment Modifications

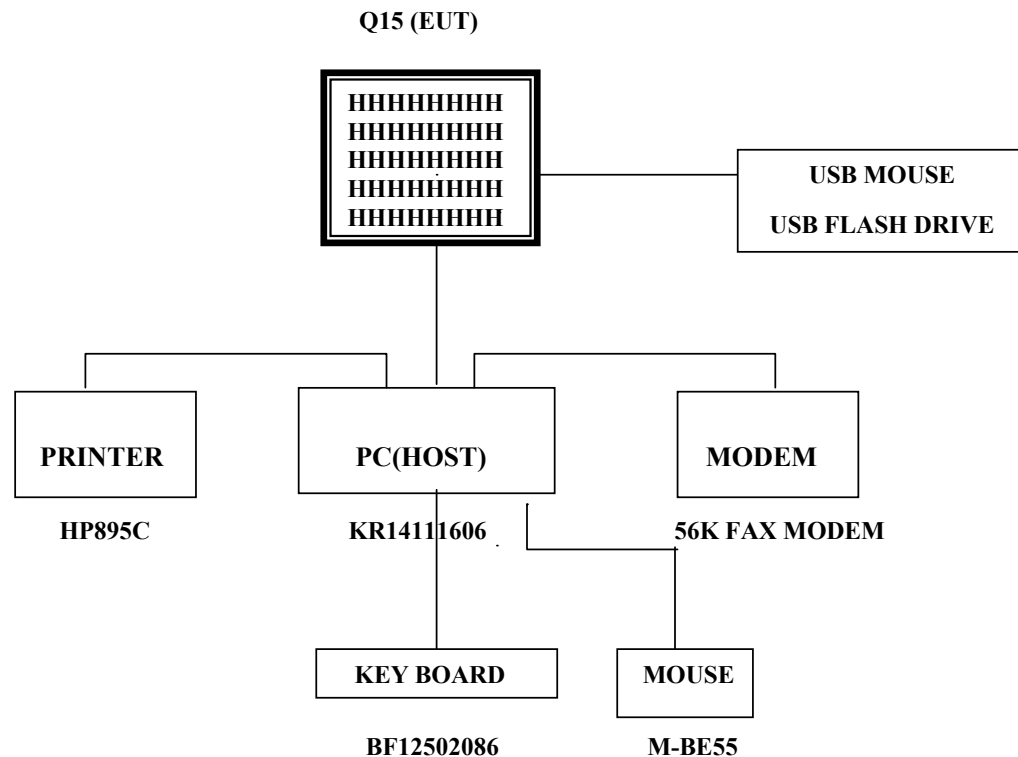
N/A

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 1GHz	1024X768 (60KHz/75Hz)	X
	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 1GHz	1024X768 (60KHz/75Hz)	X
	1024X768 (56.5KHz/70Hz)	
	800X600 (37.9KHz/60Hz)	
	800X600 (35.2 KHz/56Hz)	
	640X480 (31.5KHz/70Hz)	

Tested by Kyoung-Houn SEO / Engineer

Date : MAY 22, 2002

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	: 38 %	Temperature	: 25 °C
Limit apply to	: CISPR 22		
Type of Tests	: CLASS B		
Date	: MAY 29, 2002		
Result	: PASSED BY -7.2 dB		
EUT	: 15" LCD MONITOR		

Operating Condition : 1024 X 768 (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
14.825	52.8	NEUTRAL	60.0	-7.2	Quasi-Peak
5.000	38.1	HOT	46.0	-7.9	Average
4.990	38.0	HOT	46.0	-8.0	Average
4.930	47.0	HOT	56.0	-9.0	Average

Measured by : Kyoung-Houn SEO / Engineer

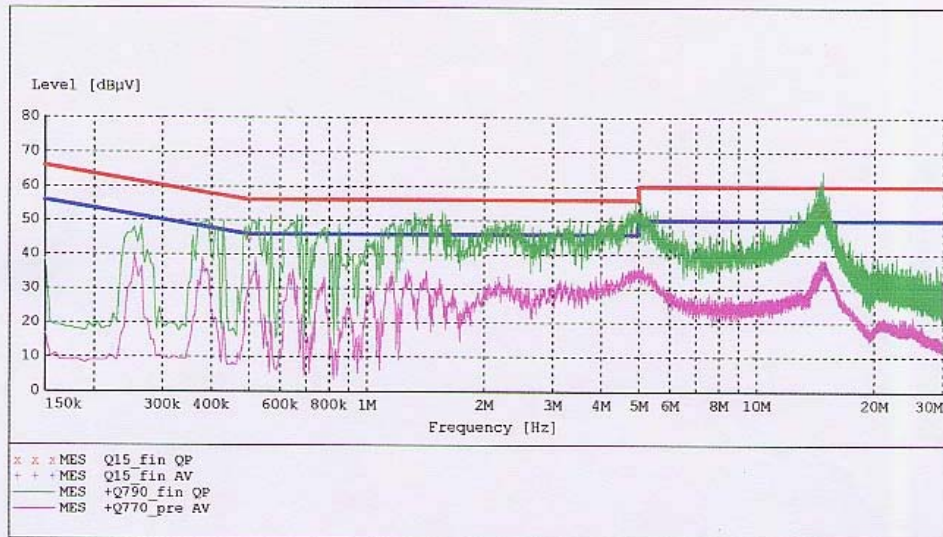
Date : MAY 29, 2002

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

EUT: Q15
Manufacturer: IMAGEQUEST
Operating Condition: 1024 768 60K 75Hz
Test Site: Shield Room
Operator: KH-SEO
Test Specification: MIC CLASS B
Comment: N
Start of Test: 5/29/02 / 8:19:09PM

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	500.0 kHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			

**MEASUREMENT RESULT: "Q15_fin QP"**

5/29/02 8:21PM

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBμV	dB	dBμV	dB		
0.500000	45.60	1.0	56	10.4	1	---
4.895000	46.30	1.6	56	9.7	1	---
14.825000	52.80	1.7	60	7.2	1	---

MEASUREMENT RESULT: "Q15_fin AV"

5/29/02 8:21PM

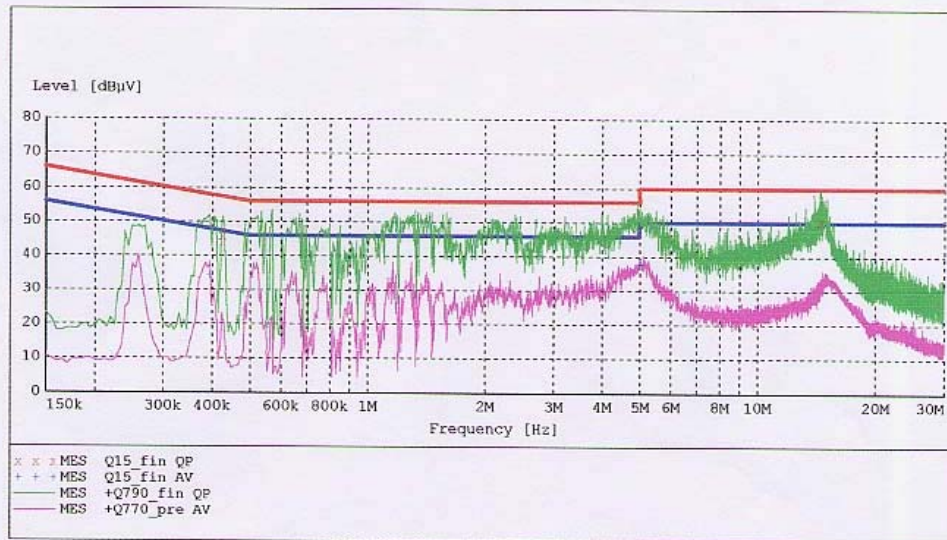
Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBμV	dB	dBμV	dB		
0.380000	35.40	1.0	48	12.8	1	---
0.520000	35.10	1.0	46	10.9	1	---
14.965000	36.40	1.7	50	13.6	1	---

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

EUT: Q15
 Manufacturer: IMAGEQUEST
 Operating Condition: 1024 768 60K 75Hz
 Test Site: Shield Room
 Operator: KH-SEO
 Test Specification: MIC CLASS B
 Comment: H
 Start of Test: 5/29/02 / 8:23:02PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			


MEASUREMENT RESULT: "Q15_fin QP"

5/29/02 8:25PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.425000	45.70	1.0	57	11.7	1	---
4.930000	47.00	1.6	56	9.0	1	---
14.535000	50.30	1.7	60	9.7	1	---

MEASUREMENT RESULT: "Q15_fin AV"

5/29/02 8:25PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.395000	34.50	1.0	48	13.5	1	---
4.990000	38.00	1.6	46	8.0	1	---
5.000000	38.10	1.6	46	7.9	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 : 38 % Temperature : 24 °C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : MAY 27, 2002
 Result : PASSED BY -3.0dB

EUT : 15" LCD MONITOR
 Operating Condition : 1024 X 768 (Hf :60 kHz, Vf : 75 Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Frequency MHz	Reading dBuV/m	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
84.0	17.73	7.17	1.90	V	26.8	30.0	-3.2
120.5	10.09	13.41	2.40	V	25.9	30.0	-4.1
126.5	9.24	13.76	2.40	V	25.4	30.0	-4.6
139.8	9.99	14.41	2.50	H	26.9	30.0	-3.1
185.9	7.36	15.24	2.80	V	25.4	30.0	-4.6
209.6	7.95	16.05	3.00	V	27.0	30.0	-3.0
336.8	13.37	16.13	3.90	H	33.4	37.0	-3.6
378.8	11.60	16.55	4.10	H	32.3	37.0	-4.8
490.8	8.73	18.17	4.90	V	31.8	37.0	-5.2
560.8	8.45	19.75	5.30	V	33.5	37.0	-3.5
616.8	6.72	21.08	5.90	V	33.7	37.0	-3.3
893.3	1.39	24.31	7.00	V	32.7	37.0	-4.3

NOTE:

1.All video modes and resolutions were investigated and the worst-case emissions are reported.

Measured by Kyoung-Houn SEO / Engineer

Date : MAY 27 , 2002

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	2002.2.14
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.11.5
EMI Test Receiver	Rohde & Schwarz	ESVS30	2002.3.6
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	2002.2.7
LISN	Rohde & Schwarz	ESH2-Z5	2001.8.12
Amplifier	Hewlett-Packard	8447E	2002.3.2
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	2002.2.20
Reference Network Impedance	Voltech	IEC 555	N.A
AC Power Source	PACIFIC	Magnetic Module	N.A
AC Power Source	PACIFIC	360AMX	N.A

