

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 (Permissive change class II)

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: JULY 27, 2002

Test Report No.: HCT-F02-0704

**Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.**
HCT FRN : 0005-8664-21

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

HYUNDAI DISPLAY TECHNOLOGY, INC. (HT15X14-100)

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).

Ki Soo Kim

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 : HT15X14-100)

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	HYUNDAI DISPLAY TECHNOLOGY.INC.	HT15X14-100

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

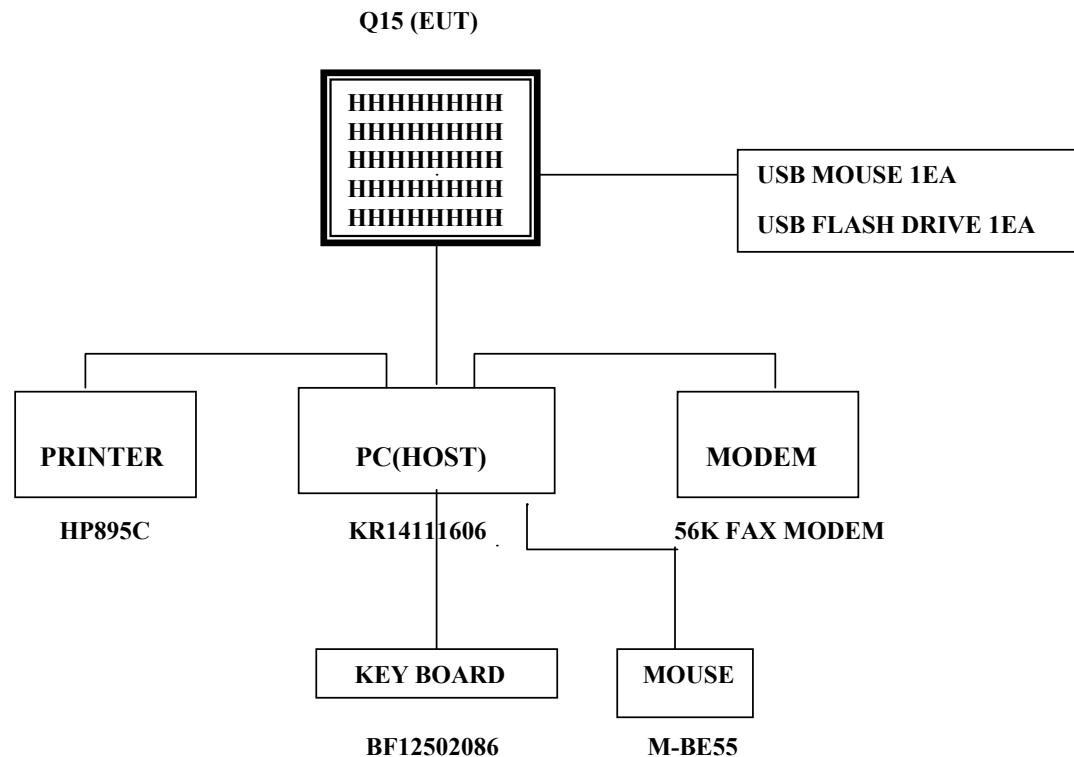
2.6 Configuration of Test system

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 : JUNE 28, 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	: 42%	Temperature : 27°C
Limit apply to	: CISPR 22	
Type of Tests	: CLASS B	
Date	: JULY 22, 2002	
Result	: PASSED BY -10.6 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
1.495	45.4	NEUTRAL	56.0	-10.6	Quasi-Peak
0.845	44.9	NEUTRAL	56.0	-11.1	Quasi-Peak
2.055	44.8	NEUTRAL	56.0	-11.2	Quasi-Peak
1.395	34.0	NEUTRAL	46.0	-12.0	Average

Measured by : Kyoung-Houn SEO / Engineer

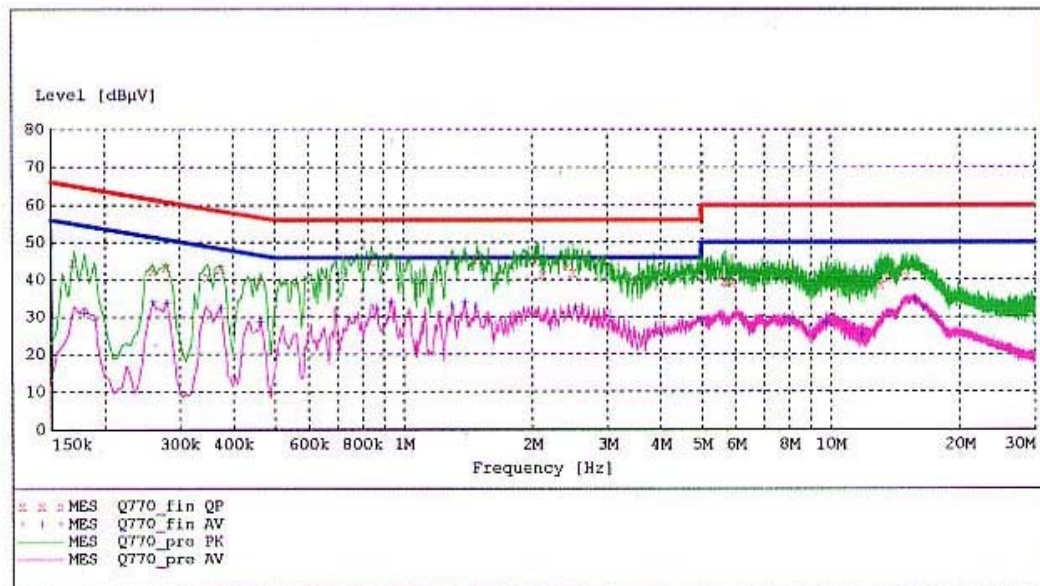
Date : JULY 22, 2002

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

EUT: Q15
 Manufacturer:
 Operating Condition: 1024 X 768 75Hz
 Test Site: Shield Room
 Operator: KH-SEO
 Test Specification: CISPR 22 CLASS B
 Comment: N
 Start of Test:

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:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.170000	44.80	0.1	65	20.1	---	---
0.260000	42.60	0.2	61	18.9	---	---
0.280000	43.30	0.2	61	17.6	---	---
0.350000	40.80	0.2	59	18.1	---	---
0.375000	43.00	0.2	58	15.4	---	---
0.465000	39.80	0.2	57	16.8	---	---
0.845000	44.90	0.2	56	11.1	---	---
1.495000	45.40	0.3	56	10.6	---	---
2.055000	44.80	0.3	56	11.2	---	---
2.135000	41.40	0.3	56	14.6	---	---
2.440000	43.60	0.3	56	12.4	---	---
2.505000	41.80	0.3	56	14.2	---	---
5.670000	39.80	0.5	60	20.2	---	---
5.720000	39.20	0.5	60	20.8	---	---

MEASUREMENT RESULT:
(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
5.900000	39.20	0.5	60	20.8	---	---
13.130000	38.80	0.8	60	21.2	---	---
13.655000	40.30	0.8	60	19.7	---	---
15.170000	41.00	0.9	60	19.0	---	---

MEASUREMENT RESULT:

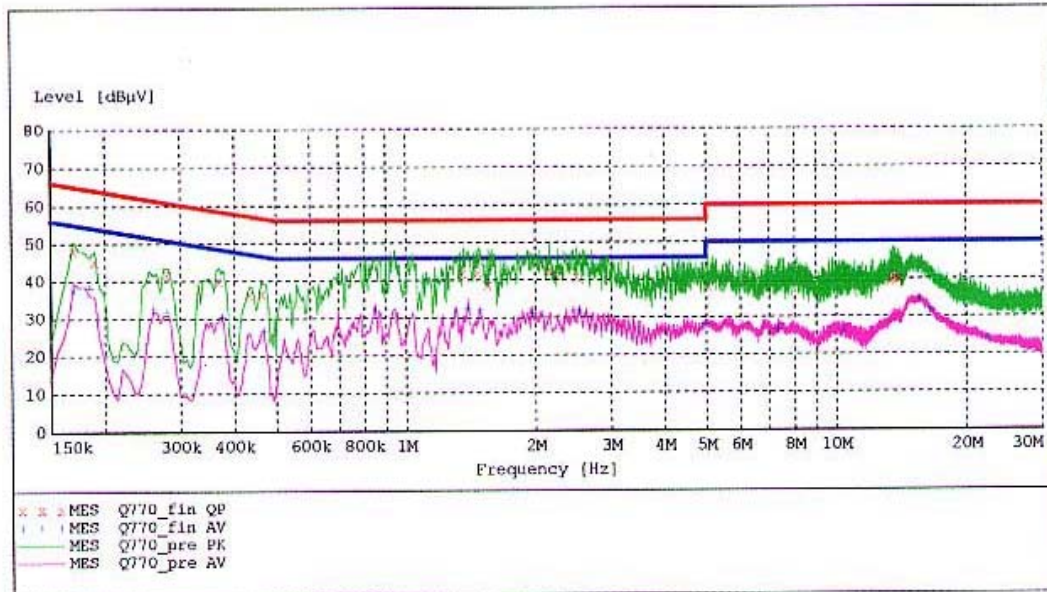
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.180000	31.30	0.1	55	23.2	---	---
0.190000	29.50	0.2	54	24.5	---	---
0.260000	34.20	0.2	51	17.2	---	---
0.280000	33.80	0.2	51	17.0	---	---
0.375000	32.50	0.2	48	15.9	---	---
0.465000	29.00	0.2	47	17.6	---	---
0.870000	32.20	0.2	46	13.8	---	---
0.940000	34.00	0.2	46	12.0	---	---
1.305000	33.30	0.3	46	12.7	---	---
1.395000	34.00	0.3	46	12.0	---	---
1.480000	33.00	0.3	46	13.0	---	---
2.540000	32.70	0.3	46	13.3	---	---
5.000000	29.60	0.5	46	16.4	---	---
8.145000	29.40	0.6	50	20.6	---	---
9.805000	28.70	0.6	50	21.3	---	---
11.910000	25.30	0.7	50	24.7	---	---
15.785000	34.90	0.9	50	15.1	---	---
16.535000	32.70	0.9	50	17.3	---	---

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

EUT: Q15
 Manufacturer:
 Operating Condition: 1024 X 768 75Hz
 Test Site: Shield Room
 Operator: KH-SEO
 Test Specification: CISPR 22 CLASS B
 Comment: H
 Start of Test:

SCAN TABLE: "EN 55022 Voltage"

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

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.170000	48.10	0.1	65	16.8	---	---
0.190000	45.20	0.2	64	18.9	---	---
0.280000	41.70	0.2	61	19.1	---	---
0.370000	39.90	0.2	59	18.6	---	---
0.435000	36.40	0.2	57	20.8	---	---
0.465000	36.50	0.2	57	20.1	---	---
1.365000	41.70	0.3	56	14.3	---	---
1.480000	42.10	0.3	56	13.9	---	---
1.560000	38.80	0.3	56	17.2	---	---
2.165000	42.60	0.3	56	13.4	---	---
2.260000	41.00	0.3	56	15.0	---	---
2.500000	40.90	0.3	56	15.1	---	---
5.055000	38.20	0.5	60	21.8	---	---
13.395000	39.50	0.8	60	20.5	---	---

MEASUREMENT RESULT:
(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
13.600000	40.10	0.8	60	19.9	---	---
13.705000	40.70	0.8	60	19.3	---	---
13.970000	40.40	0.8	60	19.6	---	---
14.075000	40.10	0.8	60	19.9	---	---

MEASUREMENT RESULT:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.170000	37.60	0.1	55	17.3	---	---
0.185000	38.40	0.2	54	15.9	---	---
0.260000	32.50	0.2	51	19.0	---	---
0.280000	31.90	0.2	51	18.9	---	---
0.375000	30.50	0.2	48	17.9	---	---
0.470000	26.90	0.2	47	19.7	---	---
0.850000	32.50	0.2	46	13.5	---	---
1.305000	31.10	0.3	46	14.9	---	---
1.395000	32.70	0.3	46	13.3	---	---
1.490000	32.00	0.3	46	14.0	---	---
1.970000	31.20	0.3	46	14.8	---	---
2.535000	31.90	0.3	46	14.1	---	---
5.000000	28.20	0.5	46	17.8	---	---
7.355000	27.00	0.5	50	23.0	---	---
10.425000	26.30	0.6	50	23.7	---	---
15.620000	34.60	0.9	50	15.4	---	---
16.535000	31.90	0.9	50	18.1	---	---
22.560000	24.10	1.1	50	25.9	---	---

4.2 Radiated Emissions Tests

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

Humidity Level : 43 % Temperature : 29 °C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JULY 25, 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	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dB	Margin dB
72.5	14.67	5.78	1.80	V	22.3	30.0	-7.8
112.4	10.78	12.39	2.30	V	25.5	30.0	-4.5
119.1	7.59	12.96	2.30	V	22.9	30.0	-7.2
154.9	9.03	14.77	2.60	V	26.4	30.0	-3.6
188.0	4.68	15.27	2.80	V	22.8	30.0	-7.3
217.7	7.06	16.64	3.30	V	27.0	30.0	-3.0
308.8	13.92	15.76	3.80	V	33.5	37.0	-3.5
347.3	12.80	16.22	4.00	V	33.0	37.0	-4.0
424.3	11.00	16.95	4.30	V	32.3	37.0	-4.8
503.0	8.60	18.62	4.90	V	32.1	37.0	-4.9
539.8	8.72	19.10	5.20	V	33.0	37.0	-4.0
788.3	3.96	22.86	6.60	V	33.4	37.0	-3.6

NOTE:

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

Measured by Kyoung-Houn SEO / Engineer

Date : JULY 25 , 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	2002.6.29
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	2002.7.11
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	2002.6.28
Dipole Antennas	Rohde & Schwarz	UHAP	2002.6.28
Biconical Antenna	Rohde & Schwarz	BBA-9106	2002.6.28
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2002.6.26
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

