

MEASUREMENT/TECHNICAL REPORT**HYUNDAI ELECTRONICS INDUSTRIES CO., LTD.****MODEL : HT-9695C**

This report concerns(check one) : Original grant ☒ Class II change _____	
Equipment type : <u>MONITOR</u>	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes _____ no ☒	
If yes, defer until: _____	
_____ agrees to notify the Commission by _____	
of the intended date of announcement of the product so that the grant can be issued on that date.	
Transition Rules Request per 15.37? yes _____ no ☒	
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-91 Edition] provision.	
Report prepared by :	BONG JAE, HUR - Manager of QA Office
Company :	HYUNDAI ELECTRONICS INDUSTRIES CO., LTD.
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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Electronics Industries Co., Ltd. Model HT-9695C(refered to as the EUT in the this report) is a 19" Color Monitor HOR. Freq. 93.7KHz w/max. Resolution of 1600 × 1200 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. ≥ 1MHz)	4.0MHz
CHIPSET BRAND AND PART NO.	MOTOROLA (MC68HC750B07B) SAMSUNG (KA358) SAMSUNG (KA339) SGS-TOMSON (TLO84CN) SGS-TOMSON (TDA9206) SGS-TOMSON (DTU32F15) SGS-TOMSON (UC3843) SGS-TOMSON (24C041) SGS-TOMSON (24C086) SGS-TOMSON (TDA9106)
POWER REQUIREMENT	100 ~ 240 VAC/50 Hz OR 60 Hz
NUMBER OF LAYERS	MAIN BOARD 1 LAYER CRT SOCKET BOARD 1 LAYER BNC BOARD 1 LAYER FRONT CONTROL BOARD 1 LAYER
MAX. RESOLUTION	1600 X 1200 NON-INTERLACED (@ 93KHz/75Hz)
H-SYNC FREQUENCY RANGE	30 KHz ~ 95 KHz
V-SYNC FREQUENCY RANGE	50 Hz ~ 150 Hz
PICTURE TUBE SIZE	19" (SAMSUNG Type : M41QCE261X112)
VIDEO CONNECTOR TYPE	D-SUB 15-PIN, BNC

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	HT-9695C	CKLHT-9695C	HOST
PC(HOST)	H/P	HP BRIO 80XX	DOC	N/A
VIDEO CARD	DIAMOND	STEALTH	FTUPCI130208	HOST
KEYBOARD	H/P	SK-2501-2D-K	DZL211029	HOST
PRINTER	H/P	C2168A	B94C2121X	HOST
MODEM	HYUNDAI	HMD-2404M	CKL8J7HMD-2404M	HOST
MOUSE	H/P	M-S34	GYUR38SK	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 3 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 on May 22, 1997 and accepted dated July 25, 1997(1300F2)

2. PRODUCT LABELLING AND USER INFORMATION

2.1 Product Label

Following is a copy of the label that will be placed on the rear side of the cabinet.

Figure 3.1 PRODUCT LABEL

Both the FCC ID and compliance statement are included in the product label

•HYUNDAI	
Model No	: HT-9695C
POWER	: AC 100V-240VAC 60Hz/50Hz, 3A
FCC ID	: CKLHT-9695C
Serial No	:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.	
" Product complies with DHHS Rules-21 CFR subchapter J-applicable at date of manufacture"	
HYUNDAI ELECTRONICS AMERICA 166 Baypoint Parkway, San Jose , CA 95134 MANUFACTURED BY HYUNDAI ELECTRONICS IND. CO., LTD.	
MADE IN KOREA	

2.2 User Information

Attachment A is the user's guide for the HT-9695C COLOR MONITOR. The informations to the user required by the FCC rules section 15.21 and 15.105 are included in the front page of the manual.

3. SYSTEM TEST CONFIGURATION

3.1 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	3040100773
CRT SOCKET BOARD	HYUNDAI	3041000867
BNC BOARD	HYUNDAI	3041000868
FRONT CONTROL BOARD	HYUNDAI	3040110772

3.2 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 key board 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.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
PC(HOST)	N	N/A	1.5(P)
MONITOR(EUT)	N	Y	1.5(P), 1.5(D)
PARALLEL	N	Y	1.5(P), 1.5(D)
KEYBOARD	N/A	Y	1.0(D)
SERIAL	N	Y	1.5(P), 1.5(D)
MOUSE(PS/2)	N/A	Y	1.8(D)

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

3.4 Noise Suppression Parts on Cable.

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
PC(HOST)	N	N/A	N	N/A
MONITOR(EUT)	Y	BOTH END	Y	BOTH END
KEYBOARD	Y	PC END	Y	PC END
PARALLEL	N	N/A	Y	BOTH END
SERIAL	N	N/A	Y	BOTH END
MOUSE(PS/2)	N	N/A	Y	PC END

3.5 Equipment Modifications

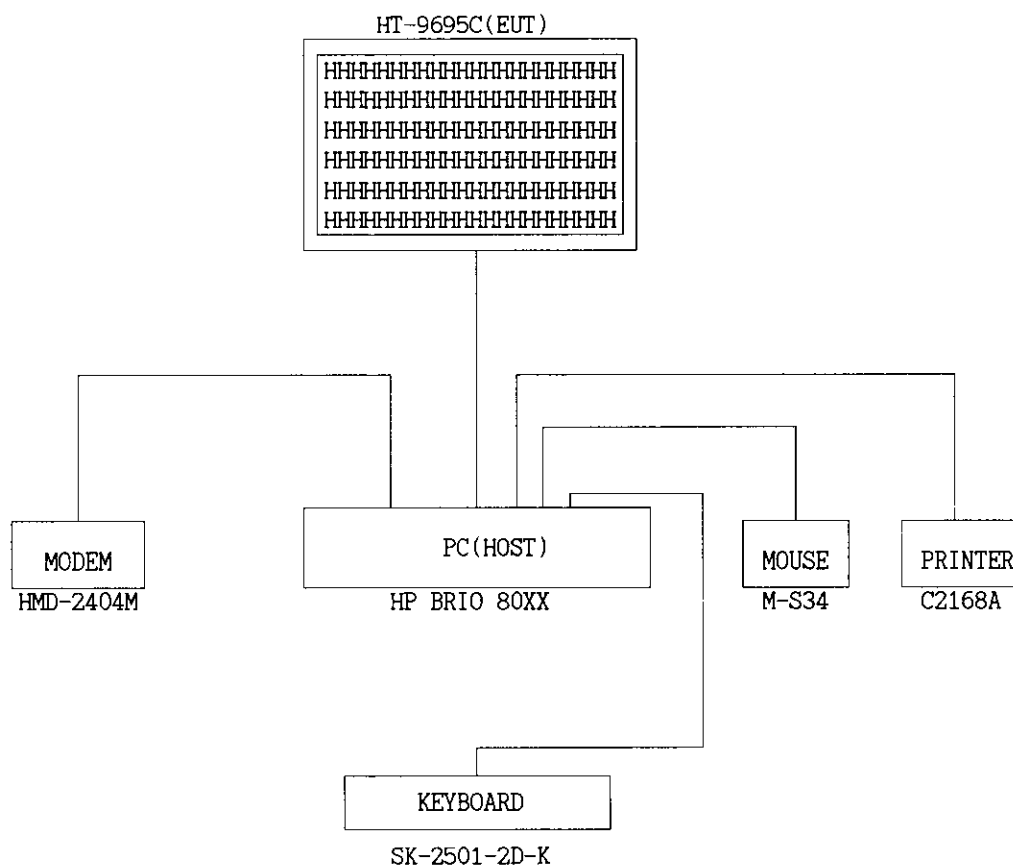
None

3.6 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN.
Preliminary Powerline 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 conditions. Final Radiated Amission tests were conducted at 3 meter open area test site.

[Configuration of Tested System]



4. PRELIMINARY TESTS

4.1 AC Powerline 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	1600 × 1200 Non-Interlaced (93.7KHz/75Hz)	X
Pentium 75 MHz	1280 × 1024 Non-Interlaced (91.1KHz/85Hz)	
Pentium 75 MHz	1024 × 768 Non-Interlaced (81.8KHz/100Hz)	
Pentium 75 MHz	800 × 600 Non-Interlaced (53.6KHz/85Hz)	
Pentium 75 MHz	640 × 480 Non-Interlaced (63.6KHz/120Hz)	

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	1600 × 1200 Non-Interlaced (93.7KHz/75Hz)	X
Pentium 75 MHz	1280 × 1024 Non-Interlaced (91.1KHz/85Hz)	
Pentium 75 MHz	1024 × 768 Non-Interlaced (81.8KHz/100Hz)	
Pentium 75 MHz	800 × 600 Non-Interlaced (53.6KHz/85Hz)	
Pentium 75 MHz	640 × 480 Non-Interlaced (63.6KHz/120Hz)	

The monitor(EUT) has two(2) video interface port (VGA 15pin D-sub, 5 BNC) to support various kinds of Graphics Adaptors. So, the test were performed with each video interface port. The final measurement was performed with VGA 15pin D-sub video interface port that produces the worst case emission.

Tested by SANG JUN, LEE

Date : JULY, 9, 1998

7. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

7.1 Conducted Emissions Tests

The following table shows the highest levels of conducted emissions on both polarizations of hot and neutral line.

Humidity Level : 40% Temperature : 22 °C
 Limit apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Tests : CLASS B
 Date : JULY. 10, 1998
 Result : PASSED BY 6.8

EUT : 19" COLOR MONITOR
 Operating Condition : 1600 × 1200 Non-Interlaced (Hf : 93.7KHz, Vf : 75Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 9 KHz)

Power Line Conducted Emissions			FCC Class B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)
0.4648	39.3	NEUTRAL	48	-8.6
0.4657	40.7	HOT	48	-7.2
0.4675	41.1	HOT	48	-6.8
0.4711	39.9	HOT	48	-8.0
0.5605	38.2	HOT	48	-9.7
0.5657	34.8	HOT	48	-13.1
3.9336	33.0	NEUTRAL	48	-14.9

Line Conducted Emissions Tabulated Data

Sang Jun Lee

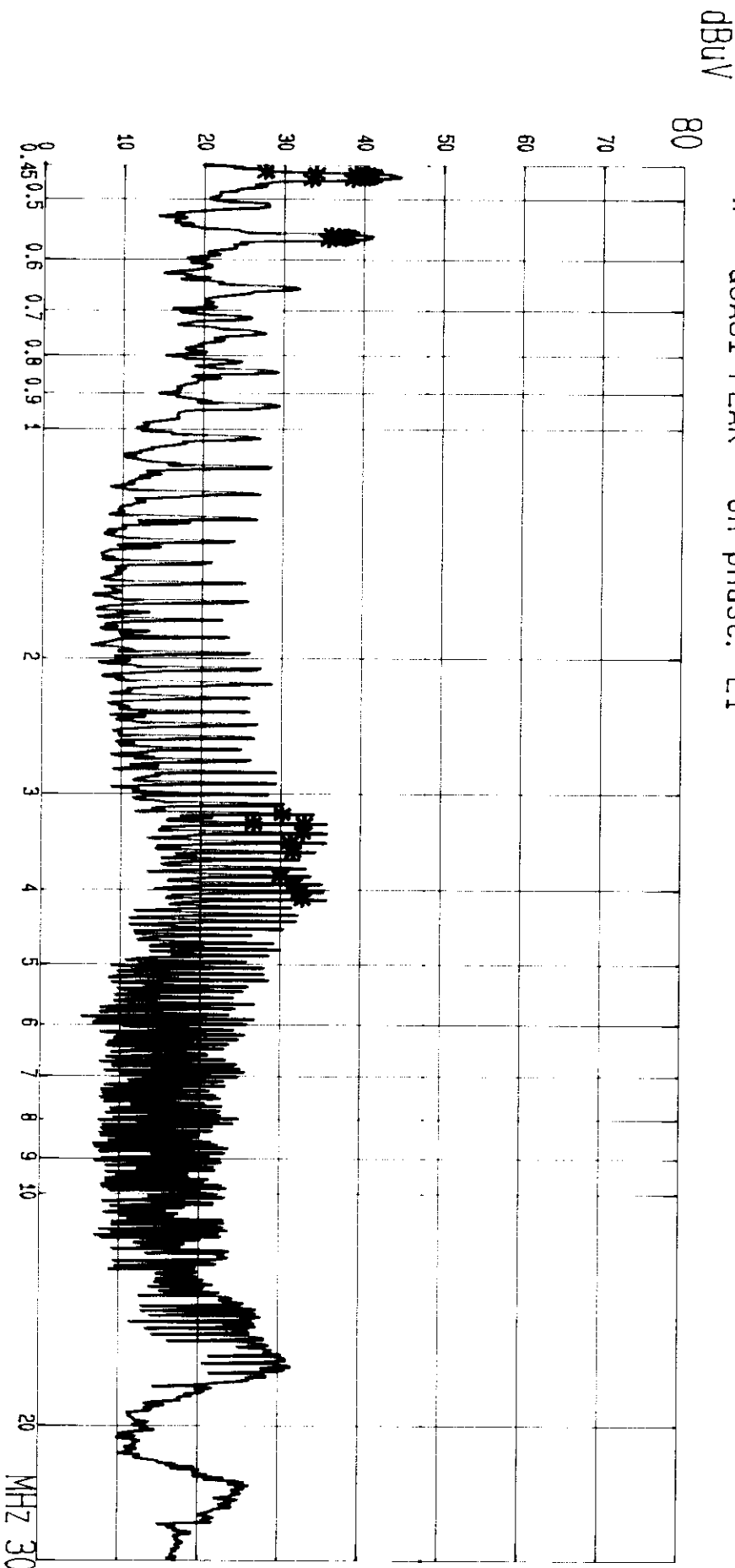
Measured by : SANG JUN, LEE / Engineer

HYUNDAI RFI Voltage Test

E.U.T.: HT-9695C
 Oper. condition: 1600 * 1200 (Mf=93.6KHz , Vf=75Hz)
 Test spec:
 FCC PART 15 SUBPART B CLASS B

Start Fr. MHz	Stop Fr. MHz	IF-BW KHz	Detec	Att. dB	Meas. T. s	Transd. type
0.4500	5.0000	10	Peak	LN	0.020	
5.0000	30.0000	10	Peak	LN	0.010	

Final evaluation: Quasi Peak
 * = QUASI PEAK on phase: L1



POWER LINE POLARITY : HOT

HYUNDAI

RFI Voltage Test

E.U.T.: HT-9695C
Oper. condition: 1600 * 1200 (Hf=93.6KHz , Vf=75Hz)
Test spec:
FCC PART 15 SUBPART B CLASS B

Exceeding values on phase: L1			
Frequency MHz	Peak dBuV	Q-Peak dBuV	GP-Margin dB
0.4621	32.2	27.4	-20.5
0.4630	37.6	33.9	-14.0
0.4639	41.9	38.8	-9.1
0.4648	43.0	40.2	-7.7
0.4657	43.7	40.7	-7.2
0.4666	44.5	41.0	-6.9
0.4675	44.0	41.1	-6.8
0.4684	43.6	41.0	-6.9
0.4693	43.7	40.7	-7.2
0.4702	43.1	40.4	-7.5
0.4711	42.3	39.9	-8.0
0.4720	41.3	38.4	-9.5
0.4729	36.6	33.3	-14.6
0.5375	39.3	35.9	-12.0
0.5585	40.7	37.4	-10.5
0.5595	40.2	37.9	-10.0
0.5605	40.5	38.2	-9.7
0.5615	40.5	38.2	-9.7
0.5625	41.2	38.0	-9.9
0.5635	40.8	37.7	-10.2
0.5646	39.9	37.2	-10.7
0.5657	38.1	35.5	-12.4
3.1848	33.8	30.0	-17.9
3.2723	29.1	26.4	-21.5
3.2786	36.0	32.9	-15.0
3.3688	35.8	32.7	-15.2
3.4614	35.8	31.1	-16.8
3.5565	34.2	31.4	-16.5
3.8357	33.5	29.8	-18.1
3.9386	34.9	31.7	-16.2
4.0262	35.2	32.2	-15.7
4.1210	36.0	32.6	-15.3

* Limit exceeded

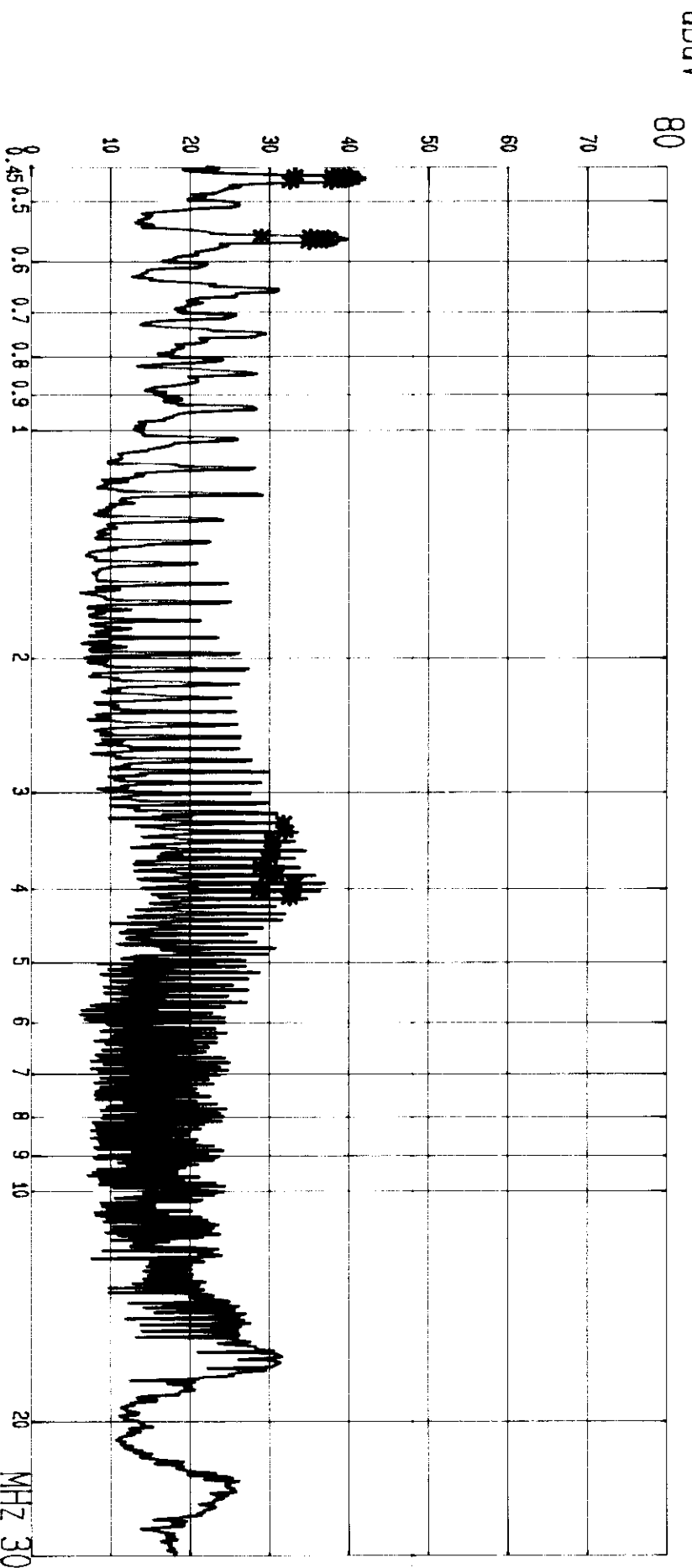
POWER LINE POLARITY : HOT

HYUNDAI RFI Voltage Test

E.U.T.: HT-9695C
 Oper. condition: 1500 * 1200 (Hf=93.6KHz, Vf=75Hz)
 Test spec:
 FCC PART 15 SUBPART B CLASS B

Start Fr. MHz	Stop Fr. MHz	If-BW kHz	Detec tor	Att. dB	Meas.T. s	Transd. type
0.4500	5.0000	10	Peak	LN	0.020	
5.0000	30.0000	10	Peak	LN	0.010	

Final evaluation: Quasi Peak
 * = QUASI PEAK on phase: L1



POWER LINE POLARITY : NEUTRAL

HYUNDAI RFI Voltage Test

E.U.T.: HT-9695C
 Oper. condition: 1600 * 1200 (Hf=93.6KHz , Vf=75Hz)
 Test spec:
 FCC PART 15 SUBPART B CLASS B

Exceeding values on phase: L1			
Frequency MHz	Peak dBuV	G-Peak dBuV	G-P-Margin dB
0.4630	36.3	33.0	-14.9
0.4639	40.8	37.9	-10.1
0.4648	41.8	39.3	-8.6
0.4657	43.1	39.8	-8.1
0.4666	43.0	40.1	-7.8
0.4675	43.4	40.2	-7.8
0.4684	43.1	40.1	-7.8
0.4693	43.1	39.9	-8.0
0.4702	42.0	39.5	-8.5
0.4711	41.1	39.0	-8.9
0.4720	40.4	37.6	-10.4
0.4729	35.3	32.5	-15.4
0.5565	32.7	28.9	-19.0
0.5575	38.3	35.1	-12.8
0.5585	39.5	36.7	-11.2
0.5595	38.5	37.2	-10.7
0.5605	39.6	37.4	-10.5
0.5615	38.7	37.5	-10.4
0.5625	39.9	37.3	-10.6
0.5635	40.2	37.0	-11.0
0.5646	39.2	36.5	-11.5
0.5657	37.4	34.8	-13.1
3.2786	35.3	31.7	-16.2
3.3688	34.9	31.9	-16.0
3.4614	34.8	30.2	-17.7
3.5565	33.9	30.2	-17.7
3.6543	33.0	29.9	-18.0
3.7475	33.2	28.9	-19.0
3.8357	34.5	30.7	-17.2
3.8431	33.8	29.6	-18.4
3.9336	36.3	33.0	-14.9
4.0184	31.7	28.7	-19.2
4.0262	35.5	32.9	-15.1
4.1210	35.3	32.4	-15.5

* Limit exceeded

POWER LINE POLARITY : NEUTRAL

7.2 Radiated Emissions Tests

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

Humidity Level : 35 % Temperature : 28 °C
 Limit apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Tests : CLASS B
 Date : JULY, 13, 1998
 Result : PASSED BY 4.7 dB

EUT : 19" COLOR MONITOR
 Operating Condition : 1600 × 1200 Non-Interlaced (Hf : 93.7KHz, Vf : 75Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Radiated Emissions		Ant.	Correction Factors		Total	FCC Class B	
Freq. (MHz)	Ampl. (dBuV)	Pol.	Antenna & Cable Loss (dB/m)		Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
40.4	18.8	V	15.4		34.2	40.0	-5.8
60.6	23.2	V	9.2		32.4	40.0	-7.6
80.8	22.9	V	8.3		31.2	40.0	-8.8
101.2	23.4	V	11.6		35.0	43.5	-8.5
161.8	16.2	V	17.9		34.1	43.5	-9.4
263.0	14.4	V	21.0		35.4	46.0	-10.6
343.9	16.4	V	19.7		36.1	46.0	-9.9
364.1	19.9	H	20.3		40.2	46.0	-5.8
465.3	18.9	V	22.4		41.3	46.0	-4.7
485.5	12.9	H	23.6		35.5	46.0	-10.5
525.9	11.8	H	23.3		35.1	46.0	-10.9
606.9	13.0	V	24.8		37.8	46.0	-8.2
647.1	10.9	H	25.5		36.4	46.0	-9.6
707.7	9.8	H	26.6		36.4	46.0	-9.6
748.1	8.3	H	27.2		35.5	46.0	-10.5
856.4	11.0	V	29.0		40.0	46.0	-6.0

Sang Jun Lee

Measured by : SANG JUN, LEE / Engineer

7. 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.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(30 \text{ dBuV/m})/20] = 31.6 \text{ uV/m}$$

8. PHOTO REPORT

The photos of EUT are attached on the following pages: