

MEASUREMENT/TECHNICAL REPORT**HYUNDAI ELECTRONICS INDUSTRIES CO.,LTD.****MODEL : HT-2595C**

This report concerns(check one) : Original grant ☒ Class II change ☐	
Equipment type : MONITOR	
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.
Address :	SAN 136-1, AMI-RI, BUBAL-EUB, ICHON-SI, KYOUNGKI-DO, KOREA
Phone No :	82-336-30-3280
Fax No :	82-336-30-3265

TABLE OF CONTENTS

	PAGE
1. GENERAL INFORMATION.....	3
1.1 Product Description.....	3
1.2 Related submittal(s)/Grant(s).....	3
1.3 Tested System Details.....	4
1.4 Test Methodology.....	4
1.5 Test Facility.....	4
2. PRODUCT LABELLING AND USER INFORMATION.....	5
2.1 Product Label.....	5
2.2 User Information.....	5
3. SYSTEM TEST CONFIGURATION.....	6
3.1 Justification.....	6
3.2 EUT Exercise Software.....	6
3.3 Cable Description.....	7
3.4 Noise Suppression Parts on Cable.....	7
3.5 Equipment Modifications.....	8
3.6 Configuration of Tested System.....	9
4. PRELIMINARY TESTS.....	10
4.1 Powerline Conducted Emissions Tests.....	10
4.2 Radiated Emissions Tests.....	10
5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS.....	11
5.1 Conducted Measurement Photo.....	11
5.2 Radiated Measurement Photo.....	12
6. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY.....	13
6.1 Conducted Emission Tests.....	13
6.2 Radiated Emission Tests.....	14
7. FIELD STRENGTH CALCULATION.....	15
8. PHOTO REPORT.....	16
8.1 Front View	
8.2 Rear View	
8.3 Side View	
8.4 Bottom View	
8.5 Inside View	
8.6 Inside View	
8.7 Inside View	
8.8 Component side of Main board	
8.9 Solder side of Main board	
8.10 Component side of CRT board	
8.11 Solder side of CRT board	
8.12 Component side of BNC board	
8.13 Solder side of BNC board	
8.14 Component side of FRONT CONTROL board	
8.15 Solder side of FRONT CONTROL board	
8.16 CRT View	
8.17 Video Interface cable	
8.18 Power cable	

1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Electronics Industries Co., Ltd. Model HT-2595C(referred to as the EUT in the this report) is a 21" Color Monitor HOR. Freq. 93.5KHz 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) SAMSUNG (KA324) SGS-TOMSON (TL084CN) SGS-TOMSON (TDA9206) SGS-TOMSON (LM393N) SGS-TOMSON (UC3843) SGS-TOMSON (24C086) SGS-TOMSON (TDA9106) MATSUSHITA (AN5767K) PIONEER (CD0012AD) GENERAL SEMICONDUCTOR (GB06J) ROHM (BA7657)
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	21" (MATSUSHITA Type : M51KYY511X52)
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-2595C	CKLHT-2595C	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)

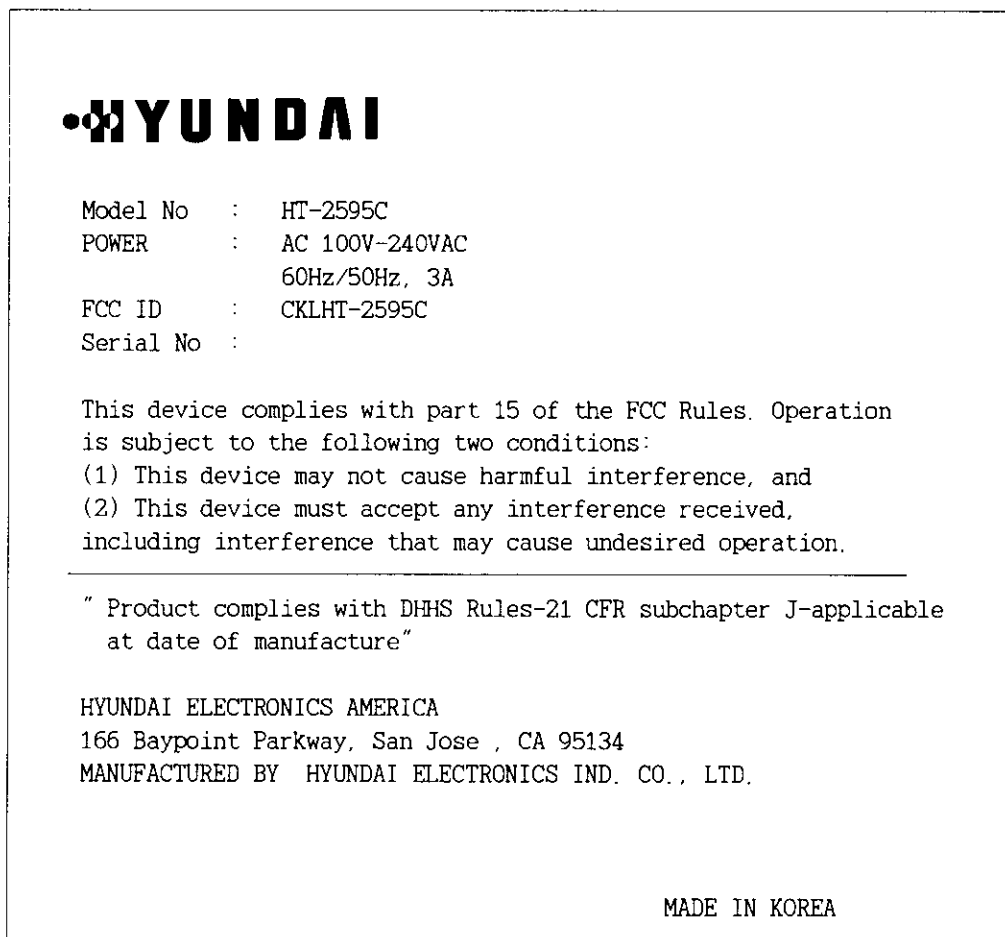
2. PRODUCT LABELLING AND USER INFORMATION

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



2.2 User Information

Attachment A is the user's guide for the HT-2595C 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

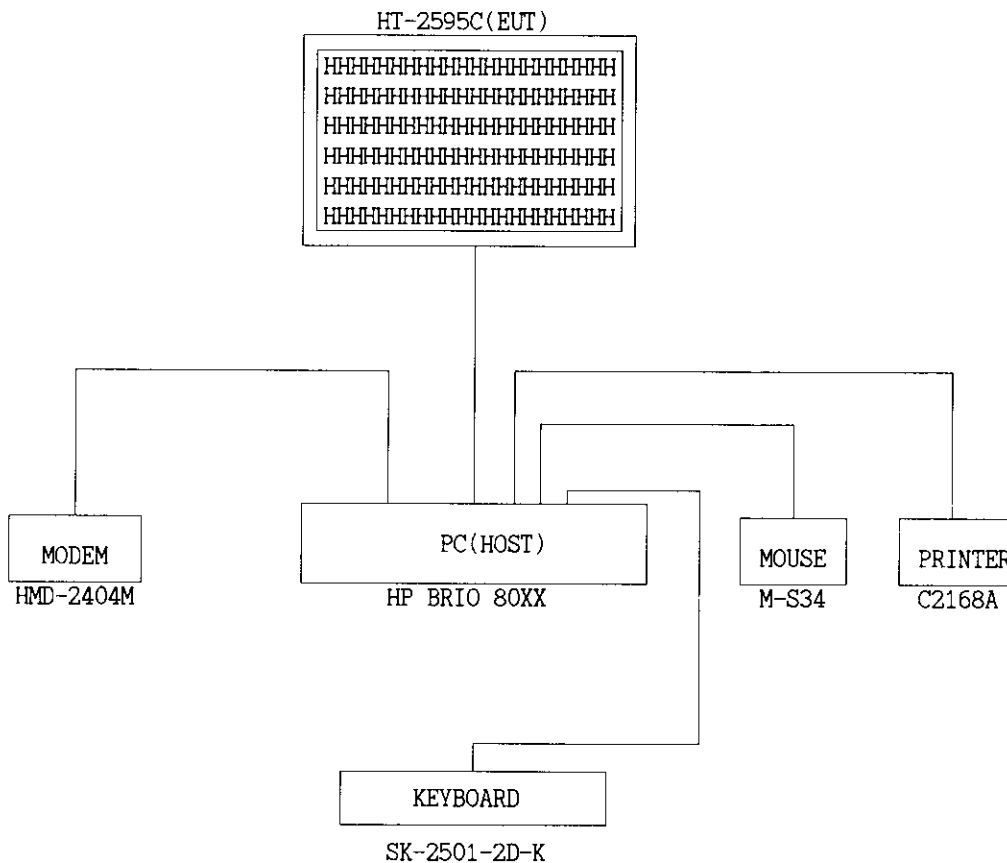
None

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.

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 : 29% Temperature : 22 °C
 Limit apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Tests : CLASS B
 Date : JULY. 8, 1998
 Result : PASSED BY 5.4 dB

=====
 EUT : 21" 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)
0.4675	41.0	HOT	48	-7.0
0.5595	42.3	HOT	48	-5.7
0.5605	42.6	HOT	48	-5.4
0.5646	41.6	HOT	48	-6.4
0.6548	36.3	HOT	48	-11.7
2.8083	39.6	HOT	48	-8.4
2.9026	37.3	HOT	48	-10.7

Line Conducted Emissions Tabulated Data

Sang Jun Lee

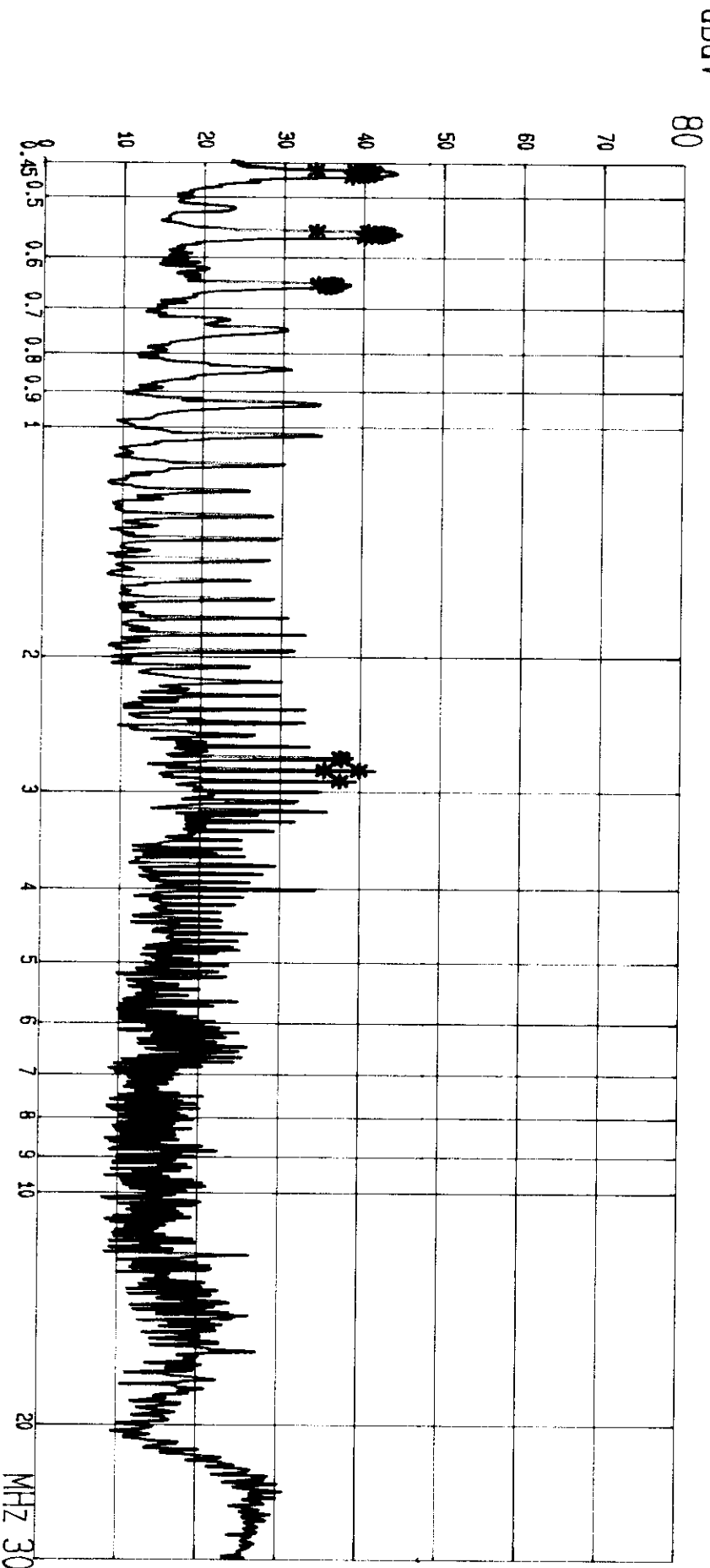
Measured by : SANG JUN, LEE / Engineer

HYUNDAI RFI Voltage Test

E.U.T.: HT-2595C
 Oper. condition: 1600 * 1200 (Hf=93.6KHz , Vf=75Hz)
 Test spec:
 FCC PART 15 SUBPART B CLASS B

Start Fr.	Stop Fr.	IF-BW	Detec	Att.	Meas.T.	Transd.
MHz	MHz	KHz	tor	dB	s	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-2595C
 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	37.1	33.6	-14.4
0.4639	41.1	38.6	-9.4
0.4648	42.3	40.1	-7.9
0.4657	43.9	40.7	-7.3
0.4666	44.0	40.9	-7.1
0.4675	43.1	41.0	-7.0
0.4684	43.4	40.9	-7.1
0.4693	43.3	40.5	-7.5
0.4702	43.1	40.2	-7.8
0.4711	41.9	39.6	-8.4
0.4720	39.7	38.2	-9.8
0.5565	36.4	33.8	-14.2
0.5575	42.3	40.2	-7.8
0.5585	43.8	41.8	-6.2
0.5595	44.8	42.3	-5.7
0.5605	45.0	42.6	-5.4
0.5615	44.9	42.6	-5.4
0.5625	44.1	42.4	-5.6
0.5635	44.0	42.0	-6.0
0.5646	43.4	41.6	-6.4
0.5657	41.4	39.9	-8.1
0.6512	36.6	34.1	-13.9
0.6524	38.1	35.7	-12.3
0.6536	38.4	36.1	-11.9
0.6548	38.9	36.3	-11.7
0.6560	38.4	36.1	-11.9
0.6572	38.0	35.7	-12.3
0.6584	36.9	35.1	-12.9
2.7123	39.2	37.3	-10.7
2.7174	38.8	37.4	-10.6
2.8083	41.9	39.6	-8.4
2.8138	37.8	35.3	-12.7
2.9023	38.7	37.3	-10.7

* Limit exceeded

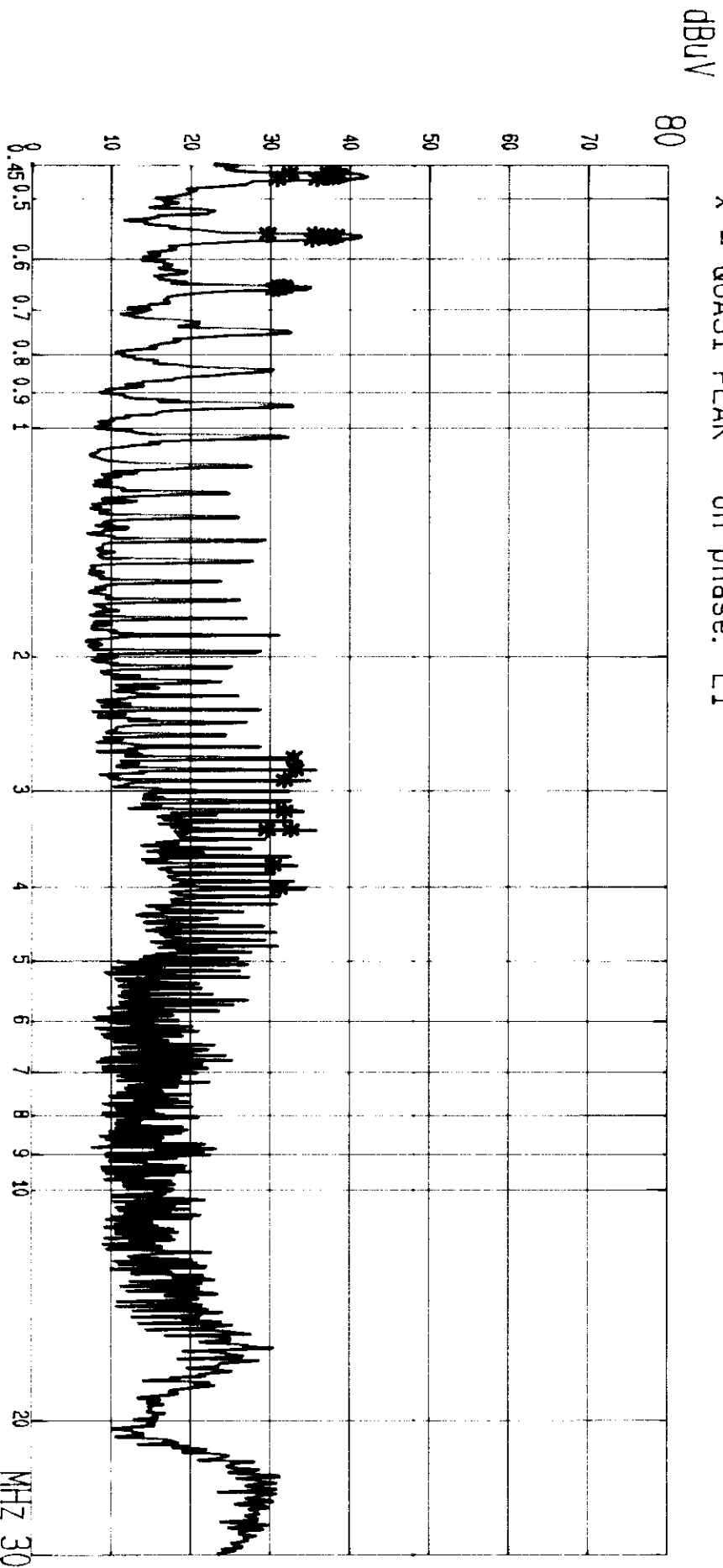
POWER LINE POLARITY : HOT

HYUNDAI RFI Voltage Test

E.U.T.: HT-2595C
 Oper. condition: 1600 * 1200 (Hf=93.6KHz , Vf=75Hz)
 Test spec:
 FCC PART 15 SUBPART B CLASS B

Start Fr.	Stop Fr.	IF-BW	Detec	Att.	Meas.T.	Transd.
MHz	MHz	KHz	tor	dB	s	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-2595C
 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	Gf-Margin dB
0.4630	34.4	32.2	-15.7
0.4639	38.6	37.0	-10.9
0.4648	40.8	37.6	-10.3
0.4657	41.9	38.3	-9.6
0.4666	41.7	38.5	-9.4
0.4675	42.2	38.3	-9.6
0.4684	42.0	38.5	-9.4
0.4693	41.1	38.1	-9.8
0.4702	40.4	37.7	-10.2
0.4711	39.7	37.1	-10.8
0.4720	38.6	35.6	-12.3
0.4729	34.3	30.7	-17.2
0.5565	33.2	29.4	-18.5
0.5575	39.5	35.5	-12.4
0.5585	40.4	37.1	-10.8
0.5595	41.2	38.1	-9.8
0.5605	41.2	38.1	-9.8
0.5615	40.8	38.1	-9.8
0.5625	40.2	37.8	-10.1
0.5635	40.5	37.5	-10.4
0.5646	39.9	37.2	-10.7
0.5657	38.1	35.1	-12.8
0.6524	34.3	30.9	-17.0
0.6536	35.0	31.4	-16.5
0.6548	35.0	31.6	-16.3
0.6560	35.0	31.4	-16.3
0.6572	34.1	30.9	-17.0
0.6584	33.3	30.3	-17.6
2.7123	33.8	32.8	-15.1
2.8083	36.2	33.0	-14.9
2.9023	34.9	31.7	-16.2
3.1848	34.7	31.7	-16.2
3.3688	36.3	32.5	-15.4
3.3753	33.2	29.4	-18.5
3.7475	34.6	30.2	-17.7
4.0262	36.0	31.1	-16.8

* 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 : 30 % Temperature : 26 °C
 Limit apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Tests : CLASS B
 Date : JULY, 8, 1998
 Result : PASSED BY 4.0 dB

EUT : 21" 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	18.7	V	15.4	34.1	40.0	-5.9
60.6	23.0	V	9.2	32.2	40.0	-7.8
80.8	23.9	V	8.3	32.2	40.0	-7.8
101.2	23.8	V	11.6	35.4	43.5	-8.1
161.8	16.3	V	17.9	34.2	43.5	-9.3
343.9	16.7	V	19.7	36.4	46.0	-9.6
364.1	19.7	H	20.3	40.0	46.0	-6.0
465.3	17.9	V	22.4	40.3	46.0	-5.7
505.7	12.5	H	22.9	35.4	46.0	-10.6
546.2	12.3	V	23.6	35.9	46.0	-10.1
606.9	12.4	V	24.8	37.2	46.0	-8.8
647.1	10.7	H	25.5	36.2	46.0	-9.8
707.7	9.5	H	26.6	36.1	46.0	-9.9
778.6	14.1	V	27.7	41.8	46.0	-4.2
856.4	12.4	V	29.0	41.4	46.0	-4.6
934.2	11.3	V	30.7	42.0	46.0	-4.0

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: