

1035

MEASUREMENT/TECHNICAL REPORT**HYUNDAI ELECTRONICS INDUSTRIES CO., LTD.****MODEL : HT-7687B**

This report concerns(check one) : Original grant <input checked="" type="checkbox"/> Class II change <input type="checkbox"/>	
Equipment type : <input type="checkbox"/> <u>MONITOR</u> <input type="checkbox"/>	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes <input type="checkbox"/> no <input checked="" type="checkbox"/>	
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 <input type="checkbox"/> no <input checked="" type="checkbox"/>	
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
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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Electronics Industries Co., Ltd. Model HT-7687B(refered to as the EUT in the this report) is a 17" Color Monitor HOR. Freq. 80KHz w/max. Resolution of 1280 × 1024 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)	16.0MHz
CHIPSET BRAND AND PART NO.	MOTOROLA (LSC4388P2) MITSUBISI (M52743ASP) MITSUBISI (M52723SP-A) NATIONAL (LM2405T) DYNACOLOR (D16F548P) SGS-TOMSON (TDA9109) SGS-TOMSON (TDA9302H) SGS-TOMSON (LM358N) SGS-TOMSON (LC21B) SGS-TOMSON (24C08)
POWER REQUIREMENT	100 ~ 240 VAC/50 Hz OR 60 Hz
NUMBER OF LAYERS	MAIN BOARD 1 LAYER CRT SOCKET BOARD 1 LAYER
MAX. RESOLUTION	1280 X 1024 NON-INTERLACED (@ 80KHz/75Hz)
H-SYNC FREQUENCY RANGE	30 KHz ~ 87 KHz
V-SYNC FREQUENCY RANGE	50 Hz ~ 150 Hz
PICTURE TUBE SIZE	17" (SAMSUNG Type : M41QAQ261X021)
VIDEO CONNECTOR TYPE	D-SUB 15-PIN

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-7687B	CKLHT-7687B	HOST
PC(HOST)	IBM	377	AN06585-I	N/A
VIDEO CARD	DIAMOND	STEALTH	FTUPCI130208	HOST
KEYBOARD	ZENITH	IB-0010	GJK101RX-6	HOST
PRINTER	HP	C2168A	B94C2121X	HOST
MODEM	HYUNDAI	HMD-2404M	CKL8J7HMD-2404M	HOST
MOUSE	IBM	13H6690	DZL210429	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)

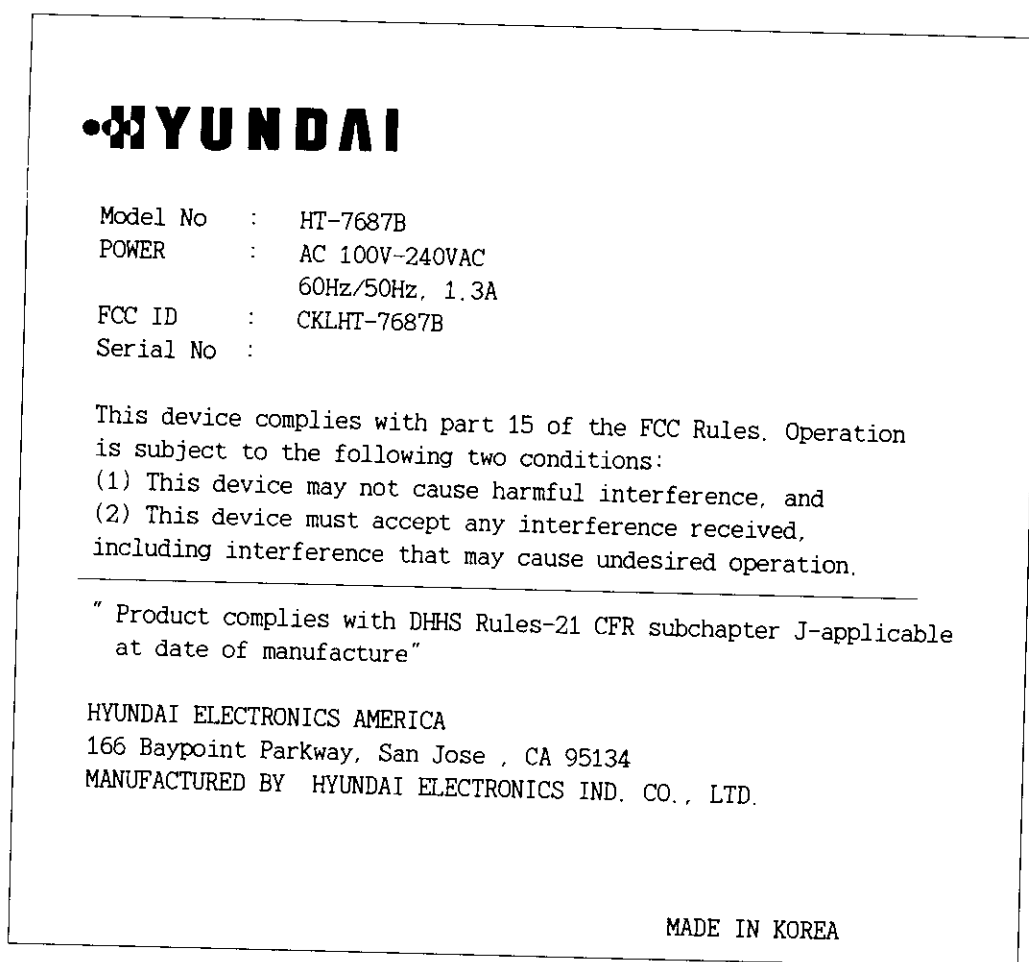
2. PRODUCT LABELLING AND USER INFORMATION

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-7687B 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	E34208714201
CRT SOCKET BOARD	HYUNDAI	E34208714201

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	PC 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

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	1280 × 1024 Non-Interlaced (79.9KHz/75Hz)	X
Pentium 75 MHz	1024 × 768 Non-Interlaced (68.6KHz/85Hz)	
Pentium 75 MHz	800 × 600 Non-Interlaced (64KHz/100Hz)	
Pentium 75 MHz	640 × 480 Non-Interlaced (50.6KHz/100Hz)	

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 × 1024 Non-Interlaced (79.9KHz/75Hz)	X
Pentium 75 MHz	1024 × 768 Non-Interlaced (48KHz/60Hz)	
Pentium 75 MHz	800 × 600 Non-Interlaced (53.6KHz/85Hz)	
Pentium 75 MHz	640 × 480 Non-Interlaced (43.2KHz/85Hz)	

Tested by SANG JUN, LEE

Date : JULY. 6, 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 : 25% Temperature : 22 °C
 Limit apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Tests : CLASS B
 Date : JULY. 6, 1998
 Result : PASSED BY 5.6 dB

EUT : 17" COLOR MONITOR
 Operating Condition : 1280 × 1024 Non-Interlaced (Hf : 80KHz, 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)
4.073	41.1	NEUTRAL	48	-6.9
4.152	42.4	NEUTRAL	48	-5.6
19.650	38.9	HOT	48	-9.1
19.890	39.3	HOT	48	-8.7
20.050	40.3	NEUTRAL	48	-7.7
20.130	40.2	NEUTRAL	48	-7.8
20.770	39.6	NEUTRAL	48	-8.4

Line Conducted Emissions Tabulated Data

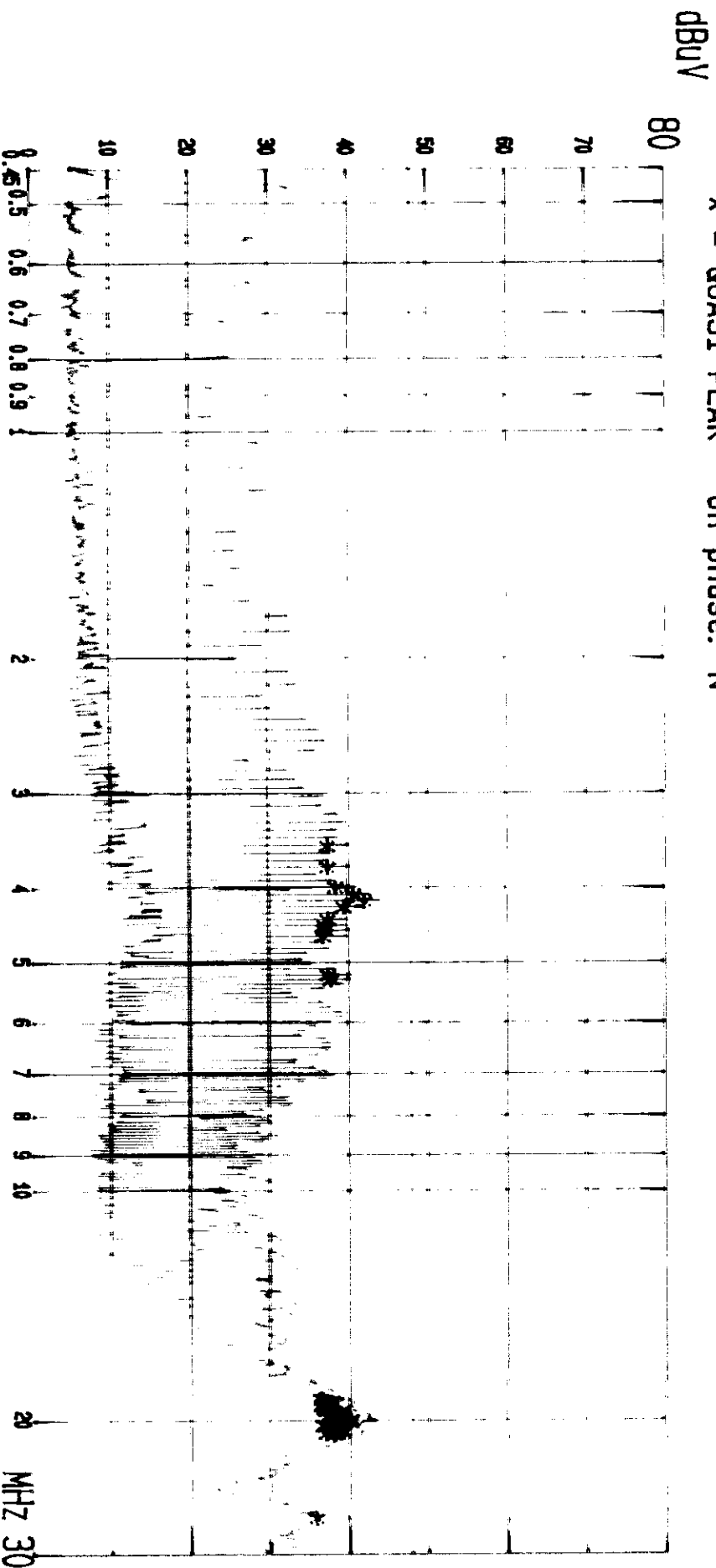
Sang Jun, Lee
 Measured by : SANG JUN, LEE / Engineer

HYUNDAI RFI Voltage Test

E.U.T.: HT-7687B
 Oper. condition: 1280 * 1024 (Hf=80.0KHz, Vf=75Hz)
 Test spec:
 FCC PART 15 SUBPART B CLASS B

Start Freq.	Stop Freq.	IF-BW	Detector	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: N



HYUNDAI

RFI Voltage Test

E.U.T.: HT-7687B
 Oper. condition: 1280 W 1024 (Hf=80.0KHz , Vf=75Hz)
 Test spec:
 FCC PART 15 SUBPART B CLASS B

Exceeding values on phase: N			
Frequency MHz	Peak dBuV	G-Peak dBuV	GP-Margin dB
3.5154	40.0	37.5	-10.5
3.7546	40.3	37.4	-10.6
3.9950	40.8	36.5	-9.5
4.0735	42.9	40.7	-7.3
4.1529	44.3	42.0	-5.0
4.2344	41.5	38.5	-8.5
4.3633	40.0	37.4	-10.7
4.4705	39.8	37.1	-10.9
4.5493	40.5	37.0	-11.1
4.6285	39.5	36.9	-11.1
5.1900	40.5	37.5	-10.5
5.2698	40.5	37.9	-10.1
18.8500	39.8	35.4	-11.6
18.9300	40.8	37.9	-10.1
19.0100	40.9	38.3	-9.7
19.0900	40.9	36.7	-11.3
19.1700	40.2	36.5	-11.6
19.4100	40.4	35.8	-11.2
19.4899	40.5	37.1	-10.9
19.5700	41.9	35.0	-10.0
19.6500	42.8	38.9	-9.1
19.7300	42.3	36.2	-9.9
19.8100	42.4	36.7	-9.3
19.8900	42.5	39.3	-8.7
19.9700	42.3	39.0	-9.0
20.0500	43.1	40.2	-7.8
20.1300	43.4	40.0	-8.0
20.2100	41.7	38.5	-9.6
20.2900	41.5	38.2	-9.8
20.3700	40.7	36.9	-11.1
20.4500	40.9	36.7	-11.3
20.5300	40.8	37.5	-10.4
20.6100	41.0	37.5	-10.2
20.6900	41.9	38.9	-9.1
20.7700	41.7	39.3	-8.7
20.8500	41.7	39.1	-10.0
20.9300	40.5	37.1	-10.9
27.0000	40.9	35.5	-12.2

N Limit exceeded

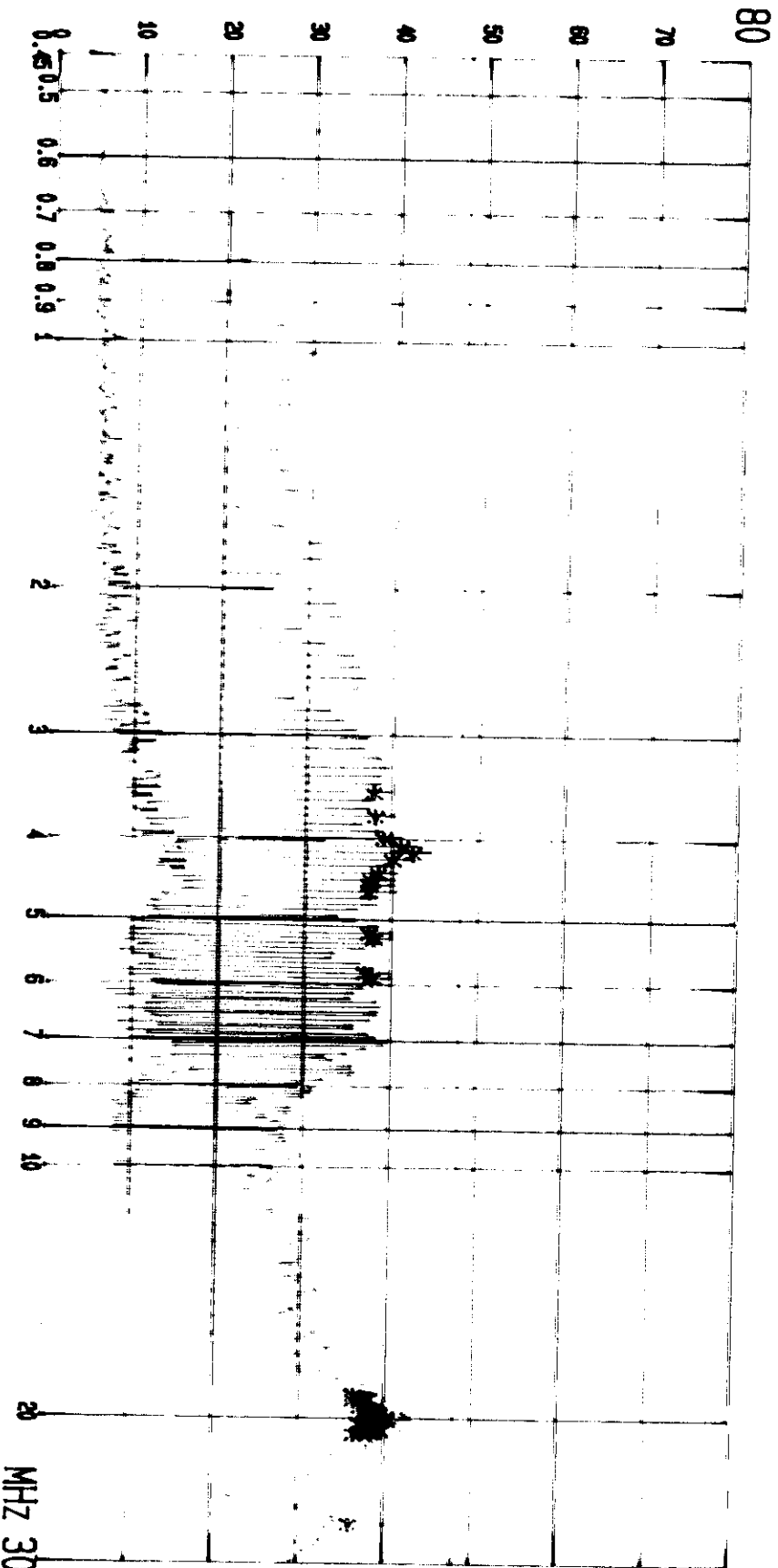
POWER LINE POLARITY : HOT

HYUNDAI RFI Voltage Test

E.U.T.: HT-7687B
 Oper. condition: 1280 W 1024 (Hf=80.0KHz . Vt=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: N



POWER LINE POLARITY : NEUTRAL

HYUNDAI
RFI Voltage Test

E.U.T.: HT-7687B
Oper. condition: 1260 # 1024 (Hf=80.0KHz , Vf=75Hz)
Test spec:
FCC PART 15 SUBPART B CLASS B

Exceeding values on phase: N			
Frequency MHz	Peak dBuV	G-Peak dBuV	G-P-Margin dB
3.5154	39.8	37.9	-10.1
3.7848	40.4	38.0	-10.0
3.9950	41.2	39.1	-9.0
4.0733	43.4	41.1	-6.9
4.1528	44.6	42.4	-5.7
4.2344	42.6	40.1	-8.0
4.3933	40.8	38.8	-9.5
4.4708	40.5	37.8	-10.4
4.5483	40.8	37.4	-10.7
4.6285	40.8	37.4	-10.6
5.1500	40.3	37.5	-10.5
5.2699	40.4	39.1	-9.8
5.8300	39.8	37.0	-11.0
5.8100	40.2	37.9	-10.1
18.8500	39.8	36.4	-11.6
18.9300	41.2	37.8	-10.2
19.0100	41.6	39.2	-9.8
19.0800	39.9	36.5	-11.5
19.4899	39.9	37.2	-10.8
19.5700	41.3	38.1	-9.9
19.6500	42.1	39.0	-9.1
19.7300	41.8	38.2	-9.8
19.8100	41.9	38.6	-9.2
19.8900	42.6	39.4	-8.7
19.9700	41.9	39.1	-8.9
20.0500	43.1	40.3	-7.8
20.1300	43.1	40.2	-7.9
20.2100	41.7	38.6	-9.5
20.2900	41.5	39.5	-9.6
20.3700	40.7	37.2	-10.8
20.4500	40.8	37.1	-10.9
20.5300	40.8	37.9	-10.1
20.6100	41.0	38.2	-9.8
20.6900	42.0	39.2	-8.8
20.7700	42.4	39.6	-8.4
20.8500	41.5	38.4	-9.6
20.9300	40.5	37.5	-10.6
21.0100	39.9	36.5	-11.5
27.0000	40.8	36.1	-11.9
N 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 : 20 % Temperature : 27 °C
 Limit apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Tests : CLASS B
 Date : JULY, 7, 1998
 Result : PASSED BY 5.2 dB

EUT : 17" COLOR MONITOR

Operating Condition : 1280 × 1024 Non-Interlaced (Hf : 80KHz, 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)
39.8	19.6	V	15.2		34.8	40.0	-5.2
41.0	17.3	V	14.9		32.2	40.0	-7.8
54.2	23.6	V	10.9		34.5	40.0	-5.5
67.4	24.8	V	7.4		32.2	40.0	-7.8
80.9	23.2	V	8.0		31.2	40.0	-8.8
134.8	20.8	V	15.5		36.3	43.5	-7.2
148.3	18.8	V	16.6		35.4	43.5	-8.1
161.8	19.3	V	17.5		36.8	43.5	-6.7
271.0	16.4	V	21.0		37.4	46.0	-8.6
284.2	15.3	H	21.5		36.8	46.0	-9.2
417.7	16.6	H	20.8		37.4	46.0	-8.6
431.4	17.2	V	21.0		38.2	46.0	-7.8
444.9	17.3	H	21.1		38.4	46.0	-7.6
458.3	16.1	V	21.4		37.5	46.0	-8.5
471.5	15.5	H	21.7		37.2	46.0	-8.8
550.7	13.9	H	22.8		39.7	46.0	-9.3

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: