

MEASUREMENT / TECHNICAL REPORT

HYUNDAI ELECTRONICS INDUSTRIES CO.,LTD.

MODEL : A725

This report concerns(check one) : Original grant ☒ Class change

Equipment type : CRT MONITOR

Deferred grant requested per 47 CFR 0.457(d)(1)() ? 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.

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ATTACHMENT A	ID Label / Location Info.
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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Electronics Industries Co., Ltd. Model (referred to as the EUT in this report) is a 17" COLOR CRT Monitor HOR. Freq. 68.7 KHz w/max. Resolution of 1024X768 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)	12 MHz
CHIPSET BRAND AND PART NO.	STMICRO ELECTRO: UUC3842N SAMSUNG ELECTRO: ULM7805CT PHILIPS H.K: 3200001396 NATIONAL SEMICO: ULM358 WELTREND: 32050011327 SAMSUNG ELECTRO: 3203000819 PHILIPS H.K: 3200000763 SAMSUNG ELECTRO: 3200001232 MYSON TECH: 3204000577
POWER REQUIREMENT	100 - 240 VAC 60/50Hz 2.0 A
NUMBER OF LAYERS	MAIN BOARD 1 LAYER CRT BOARD 1 LAYER AUDIO POWER BOARD 1 LAYER SPEAKER BOARD
MAX. RESOLUTION	1024X768 NON-INTERLACED (@68.7 KHz/85 Hz)
H-SYNC FREQUENCY RANGE	30KHz 70KHz
V-SYNC FREQUENCY RANGE	50 Hz 150Hz
CRT TYPE	17" (CRT Type :SAMSUNG M41QAR361X114)

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
COLOR MONITOR (EUT)	HYUNDAI	A725	CKLA725	HOST
PC(HOST)	H/P	DTPC-17	DoC	N/A
KEY BOARD	H/P	SK-2501-2D-K	GYUR385K	HOST
PRINTER	H/P	HP895C	DoC	HOST
MODEM	3COM CORPORATION	56K FAX MODEM	DoC	HOST
VIDEO CARD	DIAMOND	3D3000	DoC	HOST
MOUSE	H/P	M-S34	DZL211029	HOST
SPEAKER	DIAMOND	MS-030021	-	MONITOR

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 on May 22, 1997 and accepted dated July 25,1997(1300F2)

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	HYUNDAI	E4208517701
CRT BOARD	HYUNDAI	E4208616902
AUDIO POWER BOARD	HYUNDAI	E4208617703
SPEAKER BOARD	DIAMOND	380-6079

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)
PC(HOST)	N	N/A	1.8(P)
MONITOR(EUT)	N	Y	1.8(P), 1.5(D)
PRINTER	N	Y	2.0(P),1.5(D)
KEY BOARD	N/A	Y	2.0(D)
MODEM	N	Y	2.0(P),1.5(D)
MOUSE	N/A	Y	1.8(D)
SPEAKER	N	N	0.5(P),2.0(D)

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	PC END	Y	BOTH END
SPEAKER(EUT)	Y	MONITOR END	N	N/A
PRINTER	N	N/A	Y	BOTH END
KEY BOARD	Y	PC END	N	N/A
MODEM	N	N/A	Y	BOTH END
MOUSE	N	N/A	N	N/A

2.5 Equipment Modifications

N/A

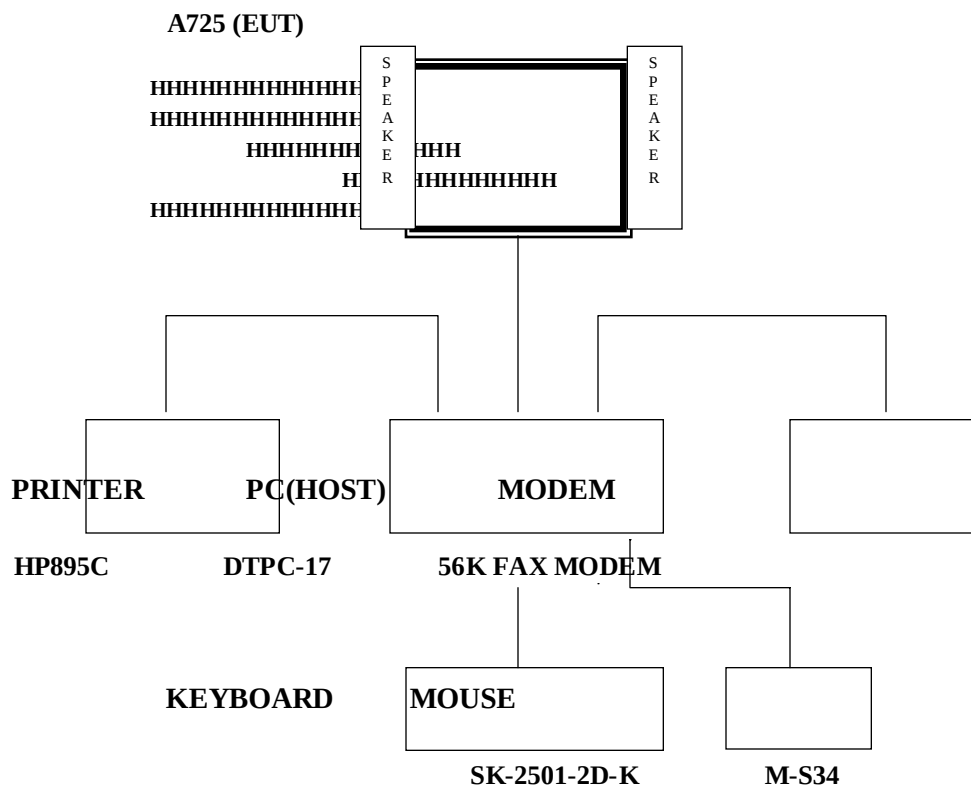
2.6 Configuration of Test system

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 350 MHz	1024 x 768 Non-Interlaced (68.7KHz/85Hz)	X
Pentium 350 MHz	800 x 600 Non-Interlaced (53.7 KHz/85Hz)	
Pentium 350 MHz	640 x 480 Non-Interlaced (50.6 KHz/100Hz)	
Pentium 350 MHz	1280x1024 Non-Interlaced (64 KHz/60Hz)	

4.2 Radiated Emission Tests

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 350 MHz	1024 x 768 Non-Interlaced (68.7KHz/85Hz)	X
Pentium 350 MHz	800 x 600 Non-Interlaced (53.7 KHz/85Hz)	
Pentium 350 MHz	640 x 480 Non-Interlaced (50.6 KHz/100Hz)	
Pentium 350 MHz	1280x1024 Non-Interlaced (64 KHz/60Hz)	

During Preliminary Tests, the following operating mode were investigated

Tested by KEUN HO, PARK / Engineer

Date : JUNE 8, 2000

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 : 32% Temperature : 24
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JUNE 9, 2000
 Result : PASSED BY -8.9 dB

EUT : 17" CRT MONITOR

Operating Condition : 1024X768 Non-Interlaced (Hf : 68.7 KHz, Vf : 85Hz)

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 (Average)	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)
7.331	41.1	H	50	-8.9
6.988	40.7	H	50	-9.3
7.058	40.7	H	50	-9.3
6.785	37.0	N	50	-13.0

NOET:

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

Other video modes & resolution were tested and found to be in compliance.

Measured by : KEUN HO, PARK / Engineer

Date : JUNE 9, 2000

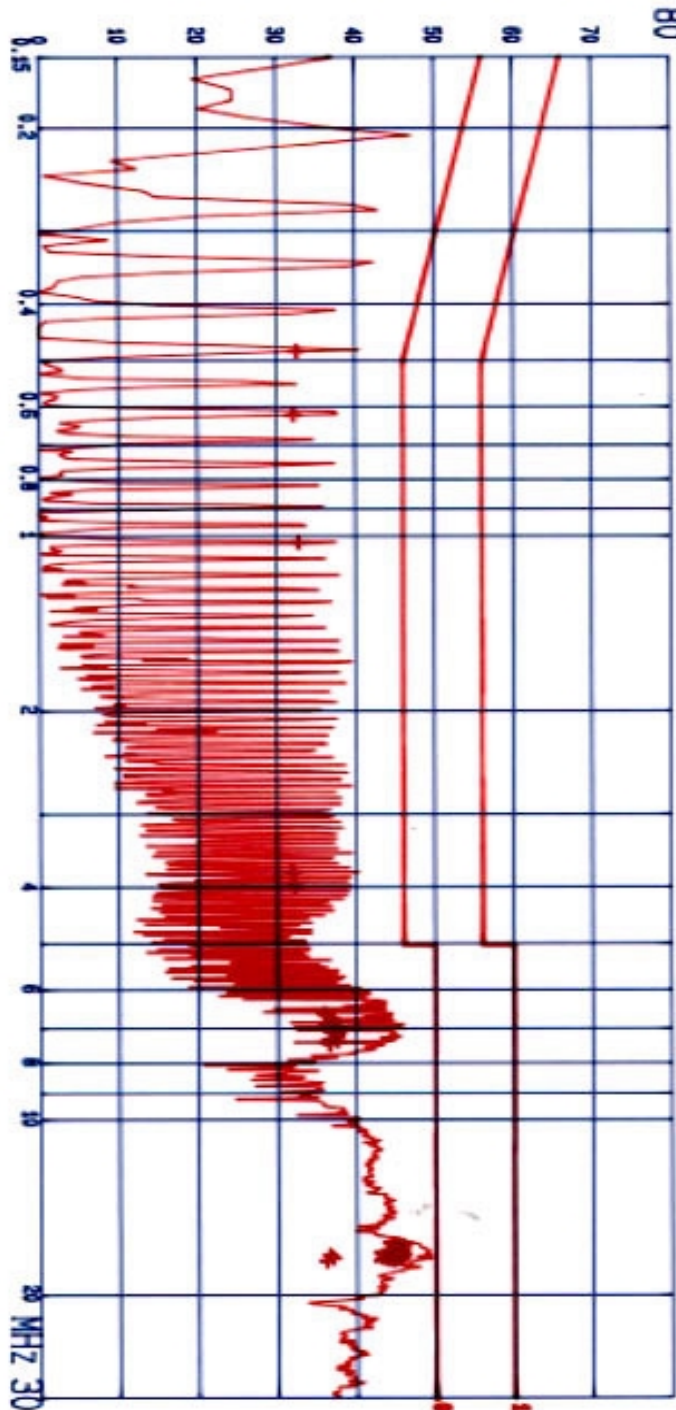
RFI Voltage Test

E.U.T.I. A725
 Oper. Condition: 1024X768 HP: 88.7MHz VF: 88MHz
 Operator: Keun Ho, Park
 Test Spec: C10PR 22 CLASS B

dBuV

Final evaluation: Quasi Peak/average
 * = QUASI PEAK + = AVERAGE

POWER LINE POLARITY: NEUTRAL



Start Freq.	Stop Freq.	IF-BW	Detector	Att.	Meas. T.	Traced.
MHz	MHz	KHz	type	dB	#	type
0.1500	5.0000	10	Peak	LD	0.010	
5.0000	30.0000	10	Peak	LN	0.010	

RFI Voltage Test

E.U.T.: A725
 Oper. Condition: 1024X768 HPI 60.7KHz VFI 65Hz
 Operator: Keun Ho, Park
 Test Spec: C18PM 22 CLASS B

Start Freq. Stop Freq. IF-BW Detect Att. Meas. T. Trained.
 MHz MHz MHz dB s type
 0.1500 5.0000 10 Peak LD 0.010
 5.0000 30.0000 10 Peak LN 0.010

POWER LINE POLARITY: NEUTRAL

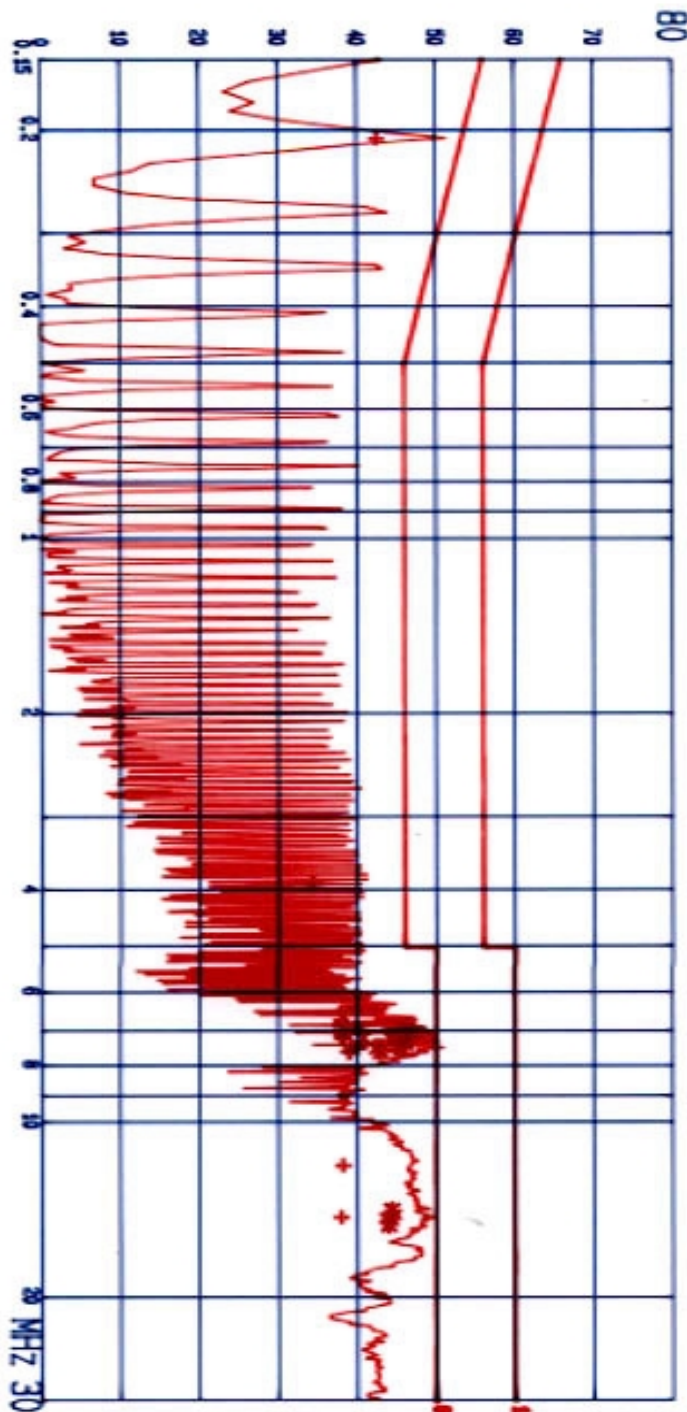
Quasi Peak values		D-Peak		GP-Margin	
Frequency MHz	Peak dBuV	dBuV	dB		
16.9750	48.1	44.8	-13.0		
16.4450	47.9	45.0	-14.9		
16.5050	48.0	44.8	-15.7		
16.5150	47.4	44.6	-15.3		
16.5750	47.4	45.2	-14.7		
16.6450	48.3	45.7	-14.2		
16.7150	48.6	45.8	-14.1		
16.7850	48.2	45.7	-14.2		
16.8510	48.0	44.8	-15.1		
16.8650	48.4	44.7	-15.8		
16.9210	48.7	45.6	-14.3		
16.9910	48.6	45.8	-14.3		
17.0610	48.4	45.7	-14.2		
17.1240	47.5	45.2	-16.7		
17.1310	48.5	44.9	-15.0		
17.2010	47.7	43.3	-18.6		
17.2540	48.3	44.9	-15.0		
17.3540	49.7	44.8	-15.1		
17.4040	48.1	44.7	-15.2		
Average values		Average		Average-Margin	
Frequency MHz	Peak dBuV	dBuV	dB		
0.4750	40.6	38.7	-13.7		
0.6150	37.8	35.2	-15.6		
1.0250	37.7	32.9	-13.1		
3.7550	40.4	38.1	-13.9		
3.8750	39.5	35.3	-15.7		
6.5750	44.6	38.1	-13.9		
6.6450	44.5	38.2	-13.8		
6.7150	44.4	36.9	-15.1		
6.7850	44.8	37.0	-13.0		
6.8150	45.6	38.3	-13.7		
6.8650	45.2	37.6	-18.4		
7.0250	44.6	38.6	-13.2		
7.1250	45.1	37.7	-12.8		
7.1910	45.7	37.4	-12.6		
7.2510	45.0	36.7	-13.3		
7.3310	44.4	37.7	-12.8		
7.4010	43.6	36.7	-13.3		
17.0510	49.4	38.7	-13.3		
17.3540	49.7	37.0	-15.0		
17.5370	47.3	36.2	-13.6		
N Limit exceeded					

RFI Voltage Test

E.U.T.I: A725
 Oper. Condition: 1024X768 Hz: 68.7KHz Vt: 65Hz
 Operator: Keun Ho, Park
 Test Spec: CISPR 22 CLASS B

Final evaluation: Quasi Peak/average
 * = QUASI PEAK + = AVERAGE

dBuV



POWER LINE POLARITY: HOT

RFI Voltage Test

E.U.T.I. A725
 Oper. Condition: 1024X768 Hf: 68.7KHz Vf: 65Hz
 Operator: Keun Ho. Park
 Test Spec: CISPR 22 CLASS B

Start Ff. Stop Ff. If-BW Detect Att. Meas. T. Trend.
 MHz MHz MHz for dB dB s type
 0.1500 5.0000 10 Peak LD 0.010
 5.0000 30.0000 10 Peak LN 0.010

POWER LINE POLARITY: HOT

Quasi Peak values	Peak	0-peak	0-peak
Frequency	dBuV	dBuV	dB-Harmon
MHz			
0.9180	48.9	48.5	-13.8
0.9880	48.5	48.7	-13.3
7.0280	50.1	48.3	-15.7
7.1280	49.2	48.1	-13.9
7.1810	50.1	48.1	-13.9
7.1280	49.5	44.7	-15.3
7.2810	50.4	45.6	-14.8
7.2810	50.3	48.0	-14.1
7.4010	49.3	45.1	-14.9
7.4840	51.1	48.7	-17.4
7.6040	49.1	43.1	-16.9
14.1140	49.2	44.4	-15.7
14.3870	48.6	44.7	-15.3
14.5800	50.0	43.9	-16.1
14.8000	49.1	44.3	-15.7
18.0730	48.9	44.0	-16.0
Average Values			
Frequency	Peak	Average	Average-Harmon
MHz	dBuV	dBuV	dB
0.8060	51.4	48.7	-10.9
3.8020	40.7	34.4	-11.6
6.7160	47.6	38.1	-11.9
6.7850	47.3	38.5	-11.5
6.8550	46.3	38.1	-11.9
6.9160	48.9	39.7	-10.3
6.9860	49.5	40.7	-9.3
7.0560	50.1	40.7	-9.3
7.1810	47.7	38.1	-11.9
7.1280	49.2	38.3	-11.7
7.1880	49.5	38.8	-11.7
7.2610	50.4	40.7	-9.3
7.3310	50.3	41.1	-8.9
7.4010	49.3	39.2	-10.6
7.4640	51.1	40.0	-10.0
7.4710	48.4	40.1	-9.9
7.5340	48.6	39.0	-11.0
7.6040	49.1	39.0	-11.0
11.8530	45.9	38.3	-11.7
14.6870	47.7	38.1	-11.9

M Limit exceeded

4.2 Radiated Emissions Tests

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

Humidity Level : 36 % Temperature : 25

Limit apply to : CISPR 22

Type of Tests : CLASS B

Date : JUNE 9, 2000

Result : PASSED BY -3.6 dB

=====

EUT : 17" COLOR MONITOR

Operating Condition : 1024X768 Non-Interlaced (Hf :68.7 kHz, Vf : 85 Hz)

Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Radiated Emissions		Ant.	Correction Factors	Total	CISPR 22	
Freq. (MHz)	Ampl. (dBuV)	Pol.	Antenna & Cable Loss (dB/m)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
94.1	14.6	V	10.6	25.2	30.0	-4.8
94.1	14.2	H	10.6	24.8	30.0	-5.2
122.5	11.8	V	14.6	26.4	30.0	-3.6
122.5	10.6	H	14.6	25.2	30.0	-4.8
329.9	9.4	V	19.5	28.9	37.0	-8.1
339.4	8.3	V	19.5	27.8	37.0	-9.2
499.6	7.5	V	22.9	30.4	37.0	-6.6

NOTE:

- 1.All video modes and resolutions were investigated and the worst-case emissions are reported.
- 2.Other video modes & resolution were tested and found to be in compliance.

Measured by : KEUN HO, PARK / Engineer

Date : JUNE 9, 2000

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.

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

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