

MEASUREMENT/TECHNICAL REPORT

HYUNDAI ELECTRONICS INDUSTRIES CO., LTD

MODEL : G910

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

Equipment type : MONITOR

Deferred grant requested per 47 CFR 0.457(d)(1)() ? yes ___ no X

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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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Electronics Industries Co., Ltd. Model G910(referred to as the EUT in this Report) is a 19"COLOR Monitor HOR. Freq. 106.1KHz w/max. Resolution of 1600X1200 Non-Interlaced

Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	PLASTIC(OUT SIDE), METAL(INSIDE)
LIST OF EACH OSC. OR XTAL. FREQ.(FREQ. 1MHz)	12 MHz
CHIPSET BRAND AND PART NO.	SANKEN: STRF6654 WELTREND: WT62P1 PHILIPS: TDA4841PS SAMSUNG: KA358 SAMSUNG: KA3843B SAMSUNG: KS24C08 ROHM: BA7657S MYSON: TTV021N-41 SAMSUNG: KA2506 NS: LM2402T
POWER REQUIREMENT	100 – 240 VAC 50/60Hz(Universal Power) 2.5A , 130W
NUMBER OF LAYER	MAIN BOARD 1 LAYER CRT SOCKET BOARD 1 LAYER BNC BOARD 1 LAYER
MAX. RESOLUTION	1600X1200 NON-INTERLACED (@106.1KHz/85Hz)
H-SYNC FREQUENCY RANGE	30KHz ~ 110KHz
V- SYNC FREQUENCY RANGE	50Hz ~ 150Hz
CRT SIZE	19" (SAMSUNG CRT / Type : M46QCE261X113)
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
COLOR MONITOR (EUT)	HYUNDAI	G910	CKLG910	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	MATROX	MIL2P/4G	DoC	HOST
MOUSE	H/P	M-S34	DZL211029	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 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	E4208417141
CRT SOCKET BOARD	HYUNDAI	E4208417142
BNC BOARD	HYUNDAI	E4208417143

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)
COLOR 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(PS2)	N/A	Y	1.8(D)

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

2.4 Noise Suppression Parts on Cable.

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

2.5 Equipment Modifications

N/A

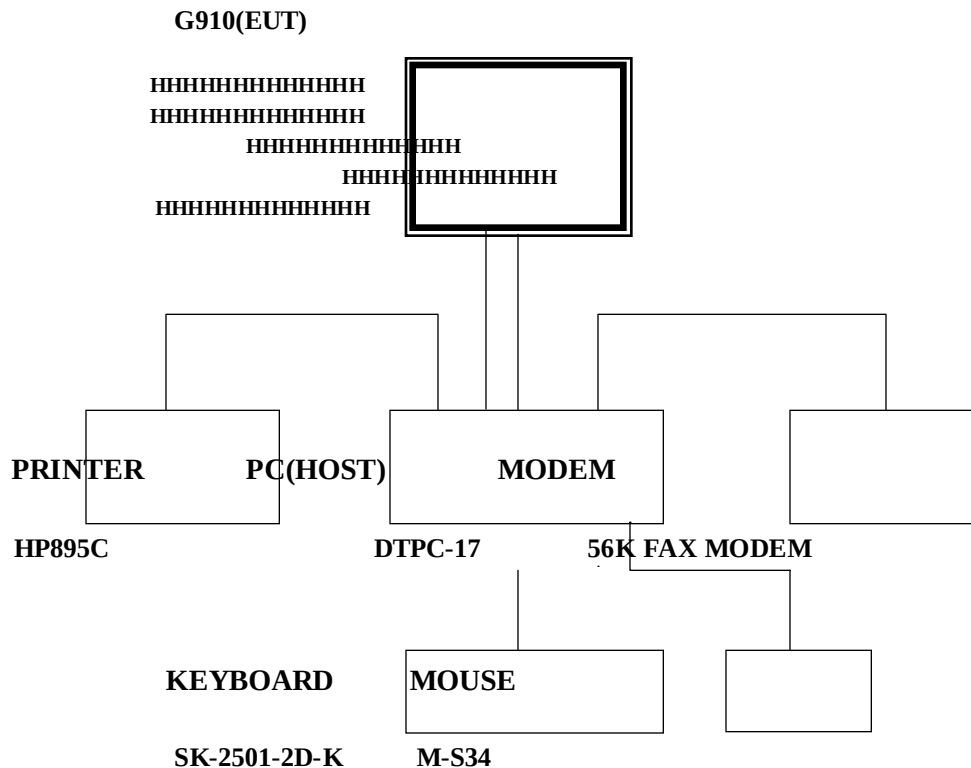
2.6 Configuration of Test system

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 75 MHz	1600 x 1200 Non-Interlaced (106.1KHz/85Hz)	X
Pentium 75 MHz	1280 x 1024 Non-Interlaced (91KHz/85Hz)	
Pentium 75 MHz	1024 x 768 Non-Interlaced (68.67KHz/85Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (63.70KHz/120Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (63.92KHz/100Hz)	

3.2 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 x 1200 Non-Interlaced (106.1KHz/85Hz)	X
Pentium 75 MHz	1280 x 1024 Non-Interlaced (91KHz/85Hz)	
Pentium 75 MHz	1024 x 768 Non-Interlaced (68.67KHz/85Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (63.70KHz/120Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (63.92KHz/100Hz)	

NOTE:

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

Tested by KEUN HO, PARK

Date : FEB. 28, 2000

4. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

4.1 Conducted Emissions Tests

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

Humidity Level : 22 % Temperature : 21
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : FEB. 29, 2000
 Result : PASSED BY -6.3 dB(Average)

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EUT : 17" COLOR MONITOR
 Operating Condition : 1600 X 1200 Non-Interlaced (Hf : 106.1KHz, Vf : 85Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 9 KHz)

Frequency (MHz)	Quasi Peak(dBuV)			Average(dBuV)			Power Line (H/N)
	LEVEL	LIMIT	Margin	LEVEL	LIMIT	Margin	
0.2130	49.9	63.2	-13.3	46.8	53.2	-6.4	N
0.3180	42.2	59.8	-17.6	42.3	49.8	-7.5	N
0.2130	48.7	63.4	-14.7	46.9	53.4	-6.3	H
0.3180	42.4	59.8	-17.4	43.1	49.8	-6.7	H

Line Conducted Emissions Tabulated Data

NOTE:

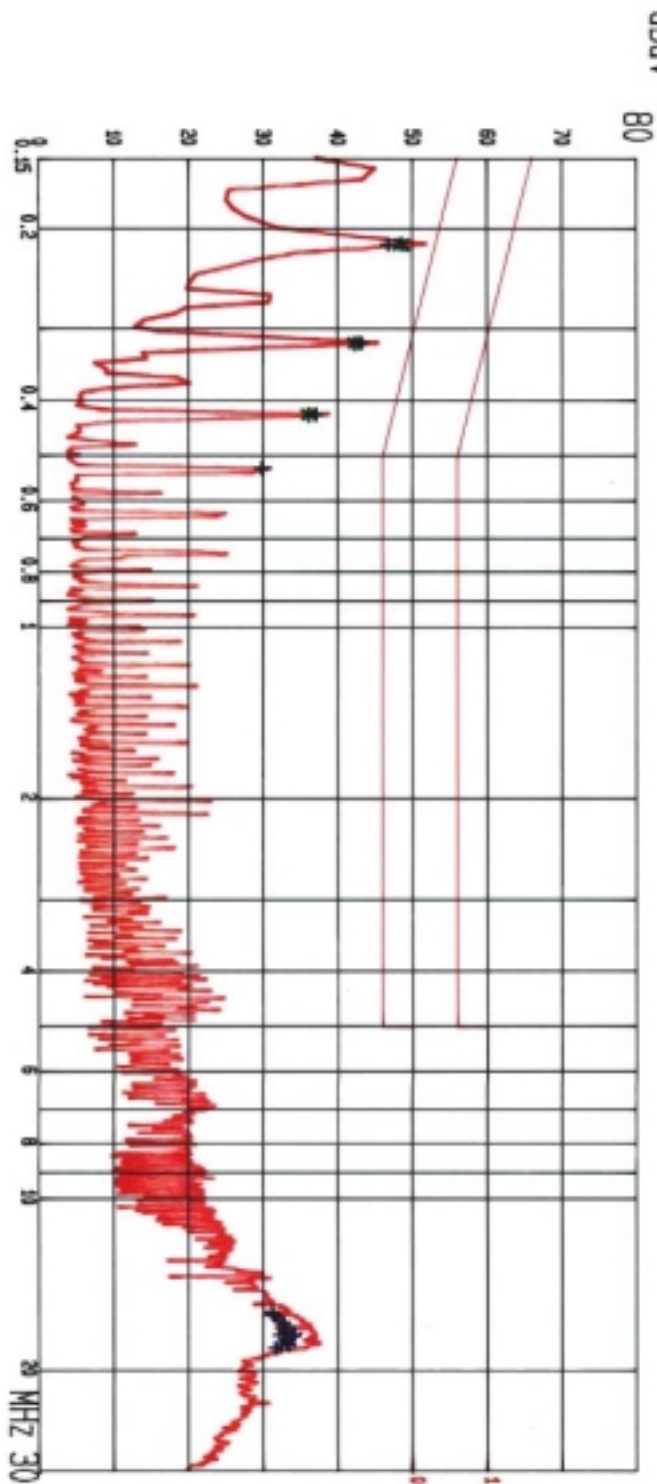
1. All video modes and resolutions were investigated and the worst-case emissions are reported
 Other video modes & resolution were tested and found to be in compliance.

Measured by : KEUN HO, PARK / Engineer

HYUNDAI RFI Voltage Test

E.U.T.: 6910
 Oper. Condition: 1600 W 1200 (HF-106.7MHz, VF-62MHz)
 Operator: KEUN HO PARK
 Test Spec: CISPR 22 CLASS B

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



POWER LINE POLARITY : HOT

Start Freq. MHz	Stop Freq. MHz	IF-BW KHz	Detec tor	Att. dB	Meas.T. s	Transd. type
0.1500	5.0000	10	Peak	LD	0.010	
5.0000	30.0000	10	Peak	LN	0.010	

HYUNDAI RFI Voltage Test

E.U.T.: 9910
 Oper. Condition: 1800 W 1200 (Hf=106.7MHz, V=55Hz)
 Operator: KEUN HO PARK
 Test Spec:
 CISPR 22 CLASS B

Quasi Peak values		Q-Peak QP-Margin	
Frequency MHz	Peak dBV	Q-Peak dBV	QP-Margin dB
0.2130	51.8	48.7	-14.5
0.3180	45.4	42.4	-17.4
0.4230	38.8	36.2	-21.2
Average values		Average-Margin	
Frequency MHz	Peak dBV	Average dBV	Average-Margin dB
0.2130	51.8	48.0	-6.3
0.3180	45.4	43.1	-6.7
0.4230	38.8	37.1	-10.3
0.5280	31.0	29.8	-16.2
0.6310	31.4	31.3	-18.7
0.7340	32.0	31.4	-18.8
0.8370	34.5	32.0	-18.0
0.9400	34.5	32.6	-17.4
1.0430	34.9	32.6	-17.2
1.1460	35.2	32.6	-17.1
1.2490	35.4	33.1	-16.8
1.3520	35.5	32.9	-17.1
1.4550	35.5	34.2	-15.8
1.5580	37.0	32.3	-17.7
1.6610	37.0	34.0	-16.0
1.7640	38.4	33.0	-16.8
1.8670	31.1	32.9	-17.1
1.9700	37.5	33.3	-16.7
2.0730	36.5	33.4	-16.6
2.1760	35.2	32.0	-17.5
2.2790	33.2	31.8	-18.4

* Limit exceeded

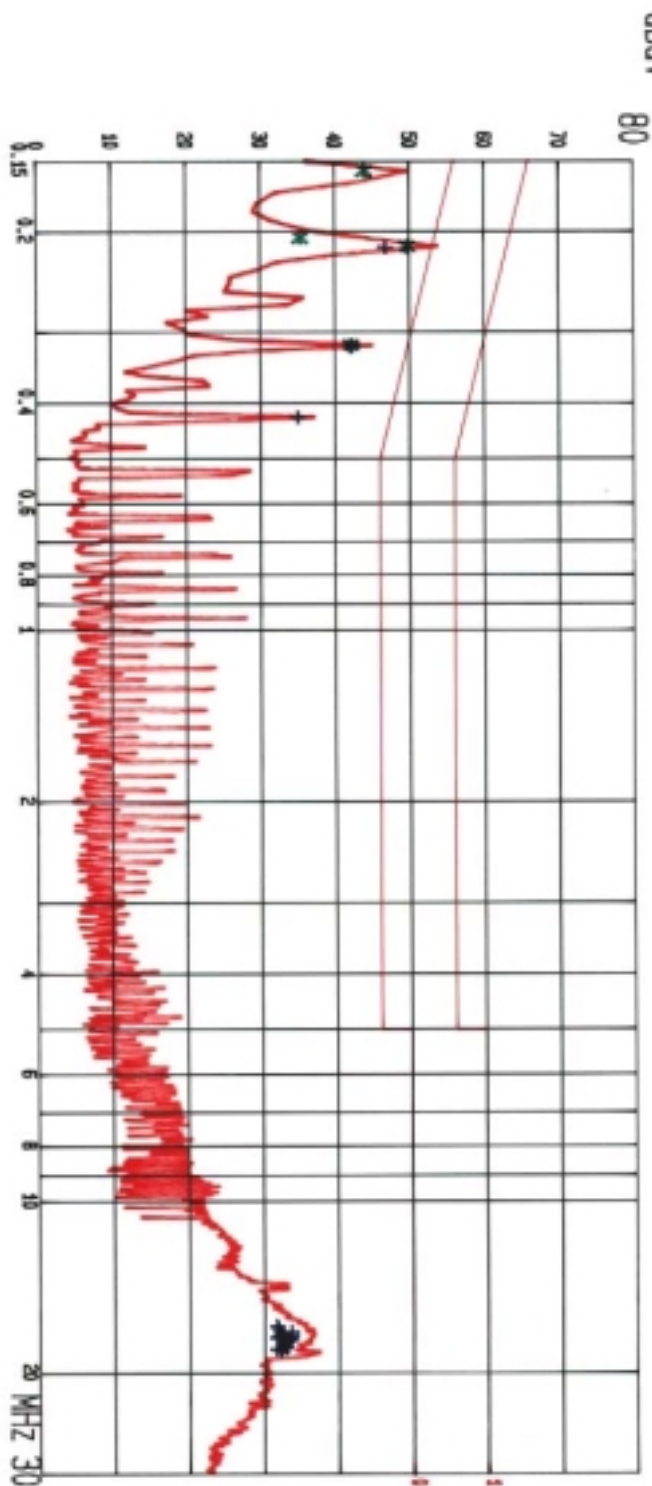
POWER LINE POLARITY : HOT

HYUNDAI RFI Voltage Test

E.U.T.1
Oper. Condition: 6810 1800 M 1200 04F=106.7KHz, V1=80Hz)
Operator: KEUN HO PARK
Test Spec:
CISPR 22 CLASS B

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

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



HYUNDAI RFI Voltage Test

E.U.T. : 0910
 Oper. Condition: 1500 M 1500 (Hf=106.7MHz , Vf=65Hz)
 Operator: KEUN HO PARK
 Test Spec:
 CISPR 22 CLASS B

Quasi Peak values		Q-Peak QP-Margin	
Frequency MHz	Peak dBuV	Q-Peak dBuV	dB
0.1570	49.8	44.0	-21.8
0.2060	44.2	35.4	-28.2
0.2130	53.8	49.9	-13.3
0.3180	45.1	42.2	-17.6
Average values		Average-Margin	
Frequency MHz	Peak dBuV	Average dBuV	dB
0.2130	53.8	46.8	-8.4
0.3180	45.1	42.3	-7.5
0.4230	37.2	35.1	-12.3
16.5570	34.7	31.6	-18.4
16.6620	34.6	31.6	-18.1
16.8490	31.1	33.6	-16.4
16.9840	30.7	32.0	-18.0
17.0890	36.7	32.5	-17.5
17.1660	34.3	33.6	-16.4
17.1940	36.3	32.5	-17.5
17.2090	36.0	32.0	-18.0
17.3830	35.0	33.7	-16.3
17.4040	36.0	31.6	-18.4
17.6000	35.3	33.4	-16.6
17.8170	34.4	32.8	-17.2
18.0340	34.2	32.4	-17.6
18.1180	35.1	33.0	-17.0
18.1460	32.2	32.8	-17.2
18.2510	35.4	31.7	-18.3
18.3630	32.2	32.2	-17.6

* Limit exceeded

POWER LINE POLARITY : NEUTRAL

4.2 Radiated Emissions Tests

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

Humidity Level : 20 % Temperature : 10
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : FEB. 29, 2000
 Result : PASSED BY -4.8 dB

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EUT : 19" COLOR MONITOR

Operating Condition : 1600 X1200 Non-Interlaced (Hf : 106.1KHz, Vf : 85Hz)

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)
31.9	4.7	V	18.0	22.7	30.0	-7.3
111.6	11.8	V	13.2	25.0	30.0	-5.0
114.6	6.7	V	13.7	20.4	30.0	-9.6
133.7	8.5	V	15.7	24.2	30.0	-5.8
133.7	9.3	H	15.7	25.0	30.0	-5.0
187.3	3.8	V	19.3	23.1	30.0	-6.9
187.3	4.4	H	19.3	23.7	30.0	-6.3
229.3	3.9	V	21.1	25.0	30.0	-5.0
229.3	4.1	H	21.1	25.2	30.0	-4.8
233.4	6.2	V	21.1	27.3	37.0	-9.7
309.5	9.6	V	18.8	28.4	37.0	-8.6
366.8	7.4	V	20.4	27.8	37.0	-9.2
389.7	8.5	V	20.9	29.4	37.0	-7.6
412.6	8.1	V	21.1	29.2	37.0	-7.8
458.5	6.6	V	22.2	28.8	37.0	-8.2

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.
- 3.The EUT was test up to 2GHz and no significant emission was found.

Measured by : KEUN HO, PARK / Engineer

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.

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

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