

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

PRODUCT COMPLIANCE TEAM
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
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CERTIFICATION

Manufacture;

IMAGEQUEST CO., LTD.
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI,
KYOUNKI-DO, 467-701, KOREA
IMAGEQUEST FRN : 0005-8664-39

Date of Issue: MAY 2, 2002

Test Report No.: HCT-F02-0501

**Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.**
HCT FRN : 0005-8664-21

(Permissive change classll)

FCC ID :

PJIL17C0D080

MODEL / TYPE :

L70A / L17C0D080

FCC Rule Part(s):

Part 15 & 2; ET Docket 95-19

Classification:

FCC Class B Peripheral Device (JBP)

Standard(s):

FCC Class B: 1998 (CISPR 22)

Equipment(EUT) Type:

17" LCD Monitor

Max Resolution:

1280X1024 (@80KHz/ 75Hz)

Port/ Connector(s)

15-pin D-sub VGA connector, USB 1 upstream port and 2 downstream ports

LCD PANEL

HYUNDAI DISPLAY TECHNOLOGY, INC. (HT17E11-300)

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.(See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HYUNDAI C-Tech. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse of 1988, 21 U.S.C.853(a).



Report prepared by : Ki-Soo Kim
Manager of EMC Tech. Part



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1. GENERAL INFORMATION

1.1 Product Description

The ImageQuest **CO., LTD.** Model L70A (referred to as the EUT in this report) is a 17" LCD Monitor HOR. Freq. 80KHz w/max. Resolution of 1280X1024 . 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)	6MHz , 12MHz , 12MHz
POWER REQUIREMENT	DC 12V --- 3.75A
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 2 LAYER POWER BOARD 2 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1280X1024 (@80KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31.0KHz ~ 80.0KHz
V-SYNC FREQUENCY RANGE	56Hz ~ 75Hz
LCD TYPE	17" (LCD Type NO : HT17E11-300)

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)	IMAGEQUEST CO., LTD.	L70A	PJIL17C0D080	HOST
PC(HOST)	H/P	KR14111606	DoC	N/A
KEY BOARD	H/P	BF12502086	DoC	HOST
PRINTER	H/P	HP895C	DoC	HOST
MODEM	3COM CORPORATION	56K FAX MODEM	DoC	HOST
VIDEO CARD	NVIDIA	NVIDIA GeForce MX 200	DoC	HOST
MOUSE	H/P	M-S48a	DoC	HOST
USB MOUSE	LOGITECH	M-BE55	DoC	EUT
USB FLASH DRIVE	Jung Myung Telecom Co.,Ltd	E-D900-00-4988	DoC	EUT

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

and accepted dated July 24,2000(Confirmation Number: EA90661)

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	ImageQuest CO., Ltd.	304100104401
POWER BOARD	ImageQuest CO., Ltd	3610200099
OSD BOARD	ImageQuest CO., Ltd.	3100700778
INVERTOR BOARD	ImageQuest CO., Ltd	3610400249
LCD BOARD	Hyundai Display	HT17E11-300

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

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

	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
MONITOR(EUT)	N	Y	1.8(P), 1.5(D), 1.5(D)
PC(HOST)	N	N/A	1.8(P)
PRINTER	N	Y	2.0(P),1.8(D)
KEY BOARD	N/A	Y	2.0(D)
MODEM	N	Y	2.0(P),0.8(D)
MOUSE	N/A	Y	1.8(D)
UPLOAD	N/A	Y	1.8(D)
USB MOUSE	N/A	N/A	0.8(D)
USB FRESH DRIVE	N/A	N/A	N/A

2.4 Noise Suppression Parts on Cable. (I/O CABLE)

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
MONITOR(EUT)	Y	BOTH END	Y	BOTH END
PRINTER	N	N/A	Y	BOTH END
KEY BOARD	N	N/A	Y	PC END
MODEM	N	N/A	Y	BOTH END
MOUSE	N	N/A	Y	PC END
UPLOAD	Y	BOTH END	Y	BOTH END
USB MOUSE	N	N/A	Y	EUT END
USB FRESH DRIVE	N	N/A	Y	EUT END

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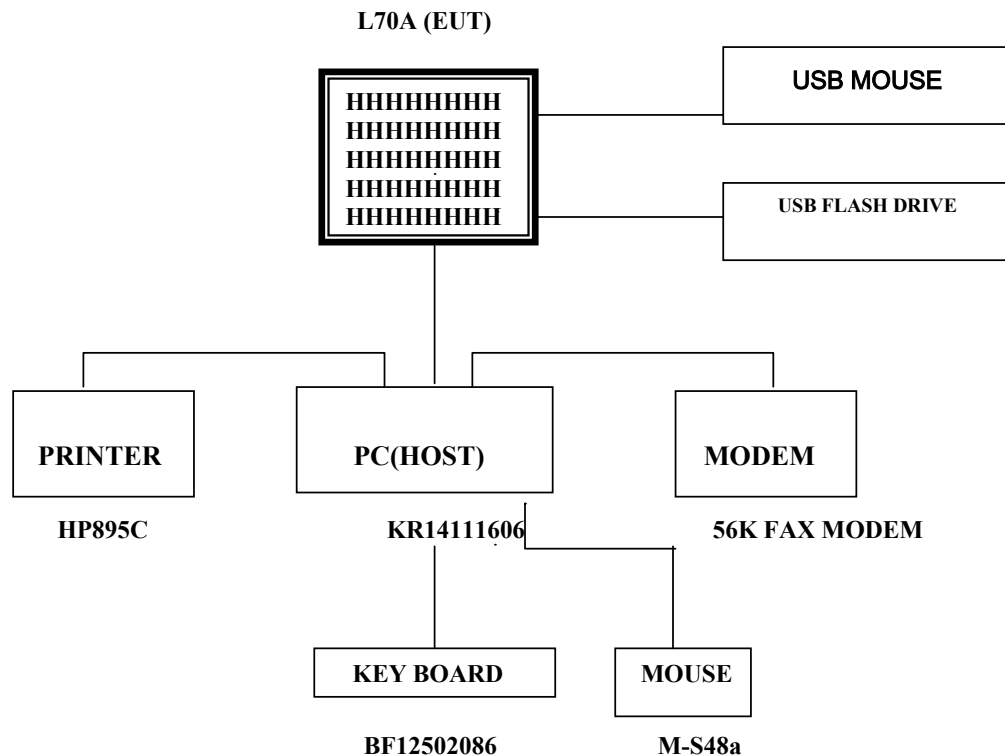
2.5 Equipment Modifications

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 1GHz	1280X1024 (80KHz/75Hz)	X
	1024X768 (60KHz/75Hz)	
	1024X768 (56.5KHz/70Hz)	
	800X600 (37.9KHz/60Hz)	
	800X600 (35.2 KHz/56Hz)	
	640X480 (31.5KHz/70Hz)	

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 1GHz	1280X1024 (80KHz/75Hz)	X
	1024X768 (60KHz/75Hz)	
	1024X768 (56.5KHz/70Hz)	
	800X600 (37.9KHz/60Hz)	
	800X600 (35.2 KHz/56Hz)	
	640X480 (31.5KHz/70Hz)	

Tested by Kyoung-Houn SEO / Engineer

Date : APRIL 2 , 2002

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 : 38% Temperature : 23 °C
Limit apply to : CISPR 22
Type of Tests : CLASS B
Date : APRIL 9, 2002
Result : PASSED BY -9.4 dB
EUT : 17" LCD MONITOR

Operating Condition : 1280X1024 (Hf : 80KHz, Vf : 75Hz)
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		
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)	Detector Mode
0.192	44.6	NEUTRAL	54.0	-9.4	Average
0.193	53.1	NEUTRAL	64.0	-10.8	Quasi-Peak
0.192	53.1	HOT	64.0	-10.8	Quasi-Peak
0.192	43.1	HOT	54.0	-10.9	Average

Measured by : Kyoung-Houn SEO / Engineer

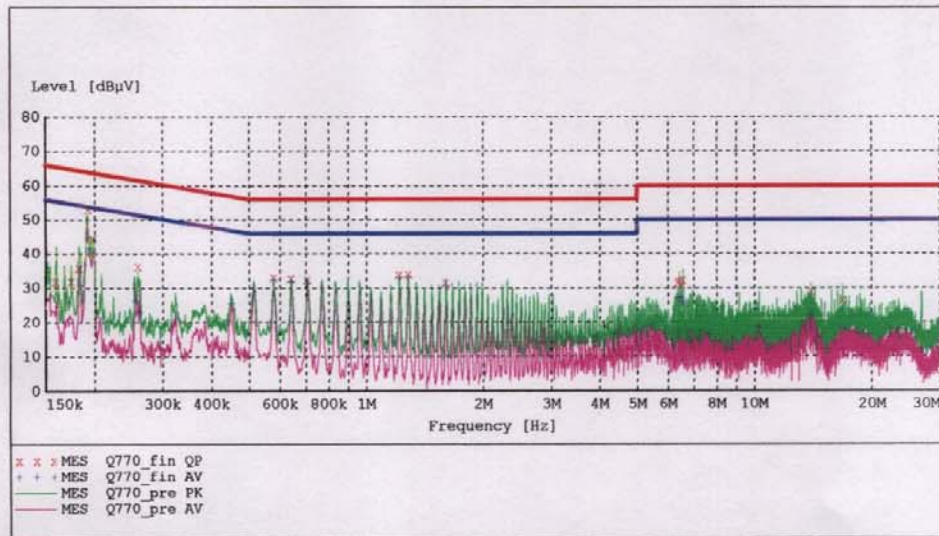
Date : APRIL 9, 2002

HYUNDAI C-TECH. CO., LTD.
EMC TEST LAB.

EUT: L70B
 Manufacturer: IMAGEQUEST
 Operating Condition: 1280 X 1024 80K 75Hz
 Test Site: Shield Room
 Operator: KH-SEO
 Test Specification: CISPR 22 CLASS B
 Comment: N
 Start of Test: 4/9/02 / 11:21:28AM

SCAN TABLE: "EN 55022 Voltage"

Short Description: EN 55022 Voltage
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 5.0 kHz MaxPeak 10.0 ms 9 kHz old-C/E FACTOR
 Average


MEASUREMENT RESULT: "Q770_fin QP"

4/9/02 11:25AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.160000	31.80	1.0	66	33.7	1	---
0.175000	32.00	1.0	65	32.7	1	---
0.183000	36.00	1.0	64	28.4	1	---
0.193000	53.10	1.0	64	10.8	1	---
0.199000	44.50	1.0	64	19.2	1	---
0.259000	36.40	1.0	62	25.1	1	---
0.580000	33.10	1.0	56	22.9	1	---
0.645000	32.80	1.0	56	23.2	1	---
0.710000	32.40	1.0	56	23.6	1	---
1.225000	33.90	1.1	56	22.1	1	---
1.290000	34.00	1.1	56	22.0	1	---
1.610000	31.60	1.2	56	24.4	1	---
6.380000	31.60	1.6	60	28.4	1	---
6.445000	32.00	1.6	60	28.0	1	---

MEASUREMENT RESULT: "Q770_fin QP"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
6.510000	31.20	1.6	60	28.8	1	---
6.570000	32.30	1.6	60	27.7	1	---
14.045000	28.90	1.7	60	31.1	1	---
16.945000	26.70	1.7	60	33.3	1	---

MEASUREMENT RESULT: "Q770_fin AV"

4/9/02 11:25AM

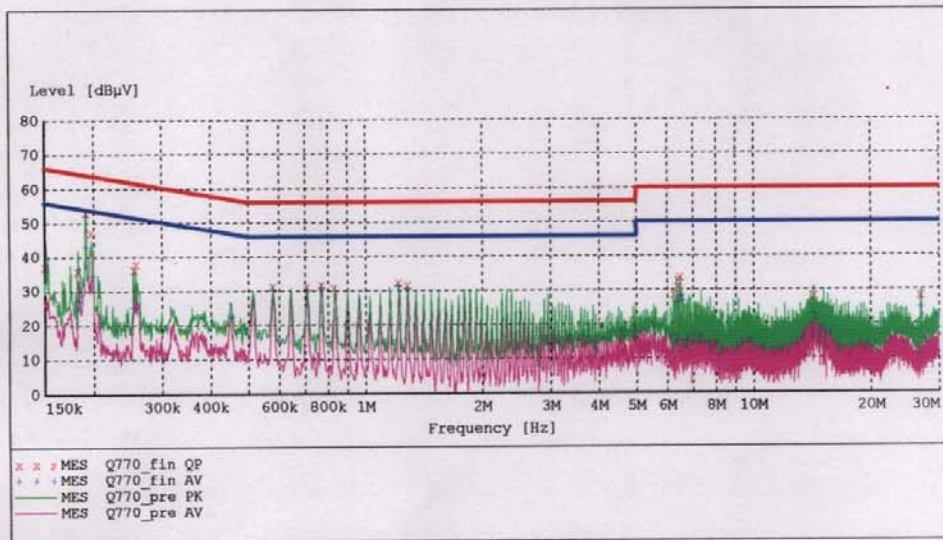
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.185000	30.80	1.0	54	23.4	1	---
0.192000	44.60	1.0	54	9.4	1	---
0.255000	26.40	1.0	52	25.2	1	---
0.262000	23.20	1.0	51	28.2	1	---
0.323000	21.20	1.0	50	28.4	1	---
0.450000	25.60	1.0	47	21.2	1	---
0.580000	32.50	1.0	46	13.5	1	---
0.645000	32.00	1.0	46	14.0	1	---
0.710000	31.70	1.0	46	14.3	1	---
1.225000	33.20	1.1	46	12.8	1	---
1.290000	33.20	1.1	46	12.8	1	---
1.610000	30.80	1.2	46	15.2	1	---
6.380000	27.30	1.6	50	22.7	1	---
6.445000	27.40	1.6	50	22.6	1	---
6.510000	26.10	1.6	50	23.9	1	---
6.570000	26.00	1.6	50	24.0	1	---
10.305000	18.70	1.7	50	31.3	1	---
14.045000	22.60	1.7	50	27.4	1	---

HYUNDAI C-TECH. CO., LTD.
EMC TEST LAB.

EUT: L70B
 Manufacturer: IMAGEQUEST
 Operating Condition: 1280 X 1024 80K 75Hz
 Test Site: Shield Room
 Operator: KH-SEO
 Test Specification: CISPR 22 CLASS B
 Comment: H
 Start of Test: 4/9/02 / 11:26:49AM

SCAN TABLE: "EN 55022 Voltage"

Short Description:			EN 55022 Voltage				Transducer
Start	Stop	Step	Detector	Meas. Time	IF Bandw.		
Frequency	Frequency	Width	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR	
150.0 kHz	30.0 MHz	5.0 kHz	Average				



MEASUREMENT RESULT: "Q770_fin QP"

4/9/02 11:30AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.151000	37.20	1.0	66	28.7	1	---
0.183000	36.00	1.0	64	28.4	1	---
0.192000	53.10	1.0	64	10.8	1	---
0.198000	47.20	1.0	64	16.5	1	---
0.255000	36.30	1.0	62	25.2	1	---
0.258000	37.90	1.0	62	23.6	1	---
0.580000	31.40	1.0	56	24.6	1	---
0.710000	31.30	1.0	56	24.7	1	---
0.775000	31.80	1.0	56	24.2	1	---
0.835000	30.80	1.0	56	25.2	1	---
1.225000	32.40	1.1	56	23.6	1	---
1.290000	31.70	1.1	56	24.3	1	---
6.250000	28.70	1.6	60	31.3	1	---
6.375000	31.00	1.6	60	29.0	1	---

MEASUREMENT RESULT: "Q770_fin QP"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
6.445000	32.80	1.6	60	27.2	1	---
6.505000	33.70	1.6	60	26.3	1	---
14.365000	28.20	1.7	60	31.8	1	---
27.000000	28.20	1.7	60	31.8	1	---

MEASUREMENT RESULT: "Q770_fin AV"

4/9/02 11:30AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.183000	25.10	1.0	54	29.2	1	---
0.184000	27.30	1.0	54	27.0	1	---
0.192000	43.10	1.0	54	10.9	1	---
0.199000	34.50	1.0	54	19.1	1	---
0.254000	25.40	1.0	52	26.2	1	---
0.452000	22.60	1.0	47	24.2	1	---
0.580000	30.60	1.0	46	15.4	1	---
0.710000	30.60	1.0	46	15.4	1	---
0.775000	31.10	1.0	46	14.9	1	---
1.160000	29.90	1.1	46	16.1	1	---
1.225000	31.60	1.1	46	14.4	1	---
1.290000	30.70	1.1	46	15.3	1	---
6.375000	26.40	1.6	50	23.6	1	---
6.445000	28.30	1.6	50	21.7	1	---
6.505000	28.00	1.6	50	22.0	1	---
6.570000	26.90	1.6	50	23.1	1	---
14.365000	22.70	1.7	50	27.3	1	---
27.000000	24.70	1.7	50	25.3	1	---

4.2 Radiated Emissions Tests

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

Humidity Level : 37 % Temperature : 21 °C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : APRIL 19, 2001
 Result : PASSED BY -3.0dB

EUT : 17" LCD MONITOR
 Operating Condition : 1280X1024 (Hf :80 kHz, Vf : 75 Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Frequency MHz	Reading dBuV/m	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
40.1	9.64	15.26	1.30	V	26.2	30.0	-3.8
53.6	14.12	9.78	1.50	V	25.4	30.0	-4.6
76.6	19.09	6.01	1.80	V	26.9	30.0	-3.1
107.6	13.14	11.46	2.20	H	26.8	30.0	-3.2
124.5	9.33	13.67	2.40	V	25.4	30.0	-4.6
216.3	7.10	16.60	3.30	V	27.0	30.0	-3.0
399.8	12.48	16.52	4.20	H	33.2	37.0	-3.8
468.0	9.85	17.95	4.80	H	32.6	37.0	-4.4
536.3	7.23	19.07	5.20	V	31.5	37.0	-5.5
590.5	7.92	20.18	5.70	V	33.8	37.0	-3.2
679.8	5.61	22.29	6.00	V	33.9	37.0	-3.1
746.5	3.56	22.54	6.40	V	32.5	37.0	-4.5

NOTE:

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

Measured by Kyoung-Houn SEO / Engineer

Date : APRIL 19, 2002

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.

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

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

6. LIST OF TEST EQUIPMENT

<u>TYPE</u>	<u>MANUFACTURE</u>	<u>MODEL</u>	<u>CAL. DATE</u>
EMI Test Receiver	Rohde & Schwarz	ESH3	2001.6.29
EMI Test Receiver	Rohde & Schwarz	ESVP	2002.2.14
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.11.5
EMI Test Receiver	Rohde & Schwarz	ESVS30	2002.3.6
Spectrum Monitor	Rohde & Schwarz	EZM	N.A
Graphic Plotter	Rohde & Schwarz	DOP2	N.A
Printer	Rohde & Schwarz	PDN	N.A
Spectrum Analyzer	H.P	8591EM	2001.7.11
LISN	EMCO	3825/2	2002.2.7
LISN	Rohde & Schwarz	ESH2-Z5	2001.8.12
Amplifier	Hewlett-Packard	8447E	2002.3.2
Dipole Antennas	Rohde & Schwarz	VHAP	2001.6.28
Dipole Antennas	Rohde & Schwarz	UHAP	2001.6.28
Biconical Antenna	Rohde & Schwarz	BBA-9106	2001.6.28
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2001.6.26
Antenna Position Tower	EMCO	1051-12	N.A
Turn Table	EMCO	1060-06	N.A
Line Filter	KEENE	ULW 2X30-60	N.A
Power Analyzer	Voltech	PM 3300	2002.2.20
Reference Network Impedance	Voltech	IEC 555	N.A
AC Power Source	PACIFIC	Magnetic Module	N.A
AC Power Source	PACIFIC	360AMX	N.A

