

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

INT'L STANDARD CERTIFICATION 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

Date of Issue: OCTOBER 27, 2001

Test Report No.: HCT-F01-1004

**Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.**

FCC ID :

**PJIL50C
L50C**

MODEL / TYPE :

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:	15" LCD Monitor
Max Resolution:	1024X768 (@60KHz/ 75Hz)
Port/ Connector(s):	15-pin D-sub VGA connector

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 L50C (referred to as the EUT in this report) is a 15" LCD Monitor HOR. Freq. 60KHz w/max. Resolution of 1024X768 . 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)	12MHz, 20MHz
POWER REQUIREMENT	DC 12V/5V --- 2.0A/2.0A
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 1 LAYER POWER BOARD 1 LAYER INVERTER BOARD 4 LAYER
MAX. RESOLUTION	1024X768 (@60KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31KHz 60KHz
V-SYNC FREQUENCY RANGE	56Hz 75Hz
LCD TYPE	15" (LCD Type : HT15X13-100)

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.	L50C	PJIL50C	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	INTELLIMOUSE	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 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.	3041001039
POWER BOARD	C&C TECH CO.,LTD.	3610200087
OSD BOARD	ImageQuest CO., Ltd.	3010700781
INVERTOR BOARD	ImageQuest CO., Ltd.	3610400244
LCD BOARD	Hyundai Display Technology Inc.	HT15X13-100

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)
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)

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	PC END	Y	BOTH END
KEY BOARD	Y	PC END	Y	PC END
MODEM	Y	PC END	Y	BOTH END
MOUSE	N	N/A	Y	PC END

2.5 Equipment Modifications

N/A

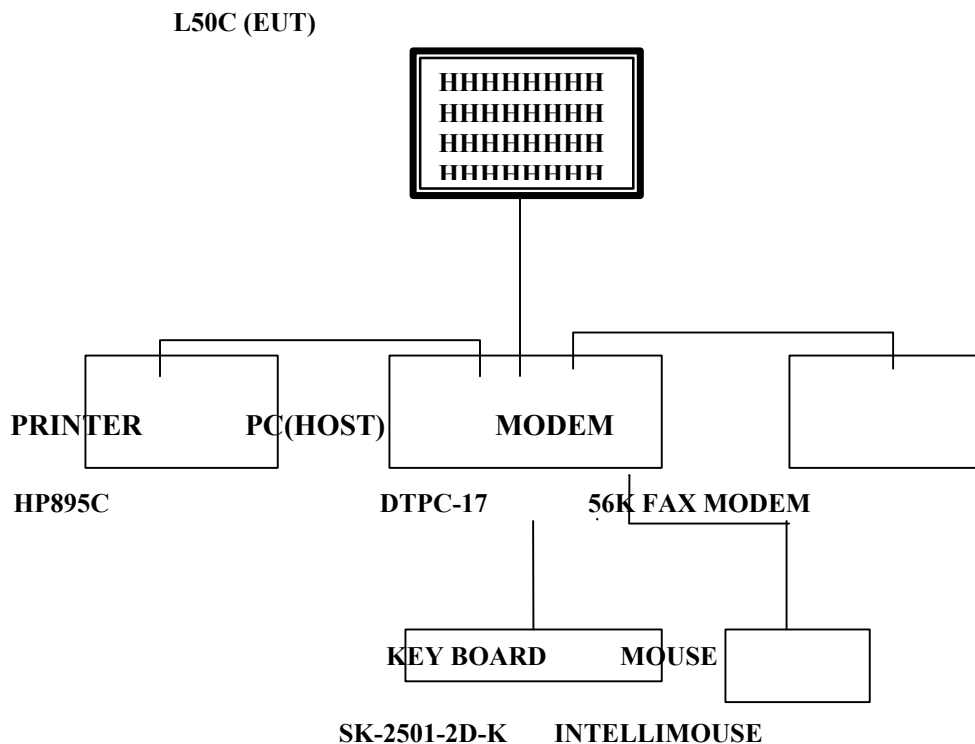
2.6 Configuration of Test system

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 350 MHz	1024X768 (60KHz/75Hz)	X
	1024X768 (48.4KHz/60Hz)	
	1024X768 (56.5KHz/70Hz)	
	720X400 (31.5KHz/70Hz)	
	800 x 600 (46.7 KHz/75Hz)	
	640 x 480 (31.5KHz/60Hz)	

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 350 MHz	1024X768 (60KHz/75Hz)	X
	1024X768 (48.4KHz/60Hz)	
	1024X768 (56.5KHz/70Hz)	
	720X400 (31.5KHz/70Hz)	
	800 x 600 (46.7 KHz/75Hz)	
	640 x 480 (31.5KHz/60Hz)	

Tested by Kyoung-Houn SEO / Engineer

Date : OCTOBER 15, 2001

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 : 35% Temperature : 28
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : OCTOBER 21 , 2001
 Result : PASSED BY 5.9 dB
 EUT : 15" LCD MONITOR

Operating Condition : 1024X768 (Hf : 60KHz, 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
0.17	59.10	NEUTRAL	65.0	5.9	Quasi-Peak
0.17	48.90	NEUTRAL	55.0	6.0	Average
0.705	39.10	NEUTRAL	46.0	6.9	Average
0.795	39.60	NEUTRAL	46.0	6.4	Average

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 : Kyoung-Houn SEO / Engineer

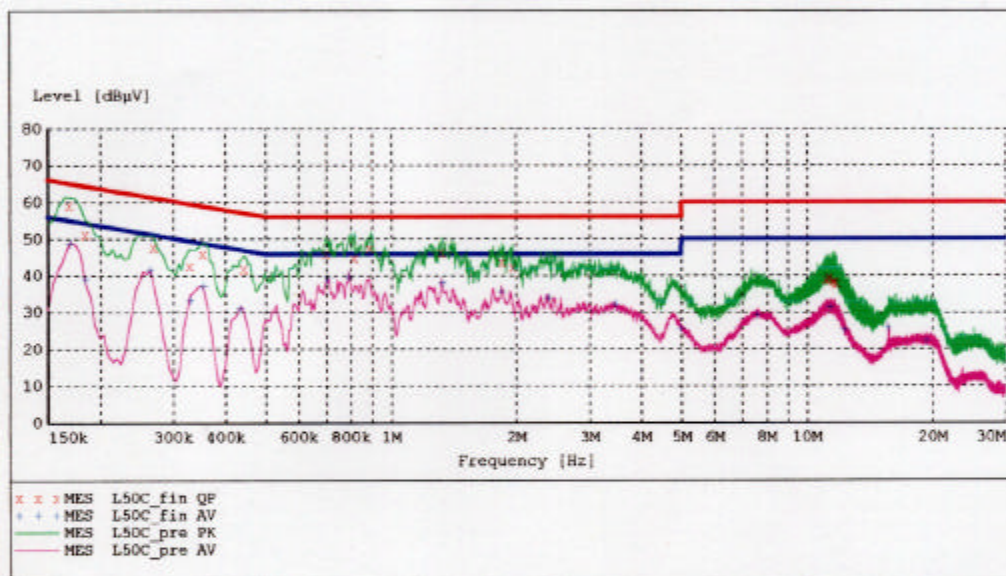
Date : OCTOBER 21, 2001

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

EUT: L50C
 Manufacturer: IMAGEQUEST
 Operating Condition: 1024 X 768 60KHz 75Hz
 Test Site: Shield Room
 Operator:
 Test Specification:
 Comment: N
 Start of Test: 10/21/01 / 5:34:36PM

SCAN TABLE:

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency 150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			



MEASUREMENT RESULT: "L50C_fin QP"

10/21/01 5:38PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.170000	59.10	0.5	65	5.9	1	---
0.185000	51.10	0.5	64	13.1	1	---
0.270000	47.70	0.5	61	13.4	1	---
0.330000	42.60	0.5	60	16.9	1	---
0.355000	45.80	0.5	59	13.1	1	---
0.445000	41.70	0.5	57	15.3	1	---
0.700000	45.90	0.5	56	10.1	1	---
0.820000	44.80	0.5	56	11.2	1	---
0.895000	47.50	0.5	56	8.5	1	---
1.330000	46.30	0.5	56	9.7	1	---
1.860000	43.60	0.6	56	12.4	1	---
1.970000	42.20	0.6	56	13.8	1	---
11.165000	38.90	1.3	60	21.1	1	---
11.350000	39.50	1.3	60	20.5	1	---

MEASUREMENT RESULT: "L50C_fin QP"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
11.390000	39.20	1.3	60	20.8	1	---
11.625000	38.60	1.4	60	21.4	1	---
11.715000	38.30	1.4	60	21.7	1	---
11.840000	37.80	1.4	60	22.2	1	---

MEASUREMENT RESULT: "L50C_fin AV"

10/21/01 5:38PM

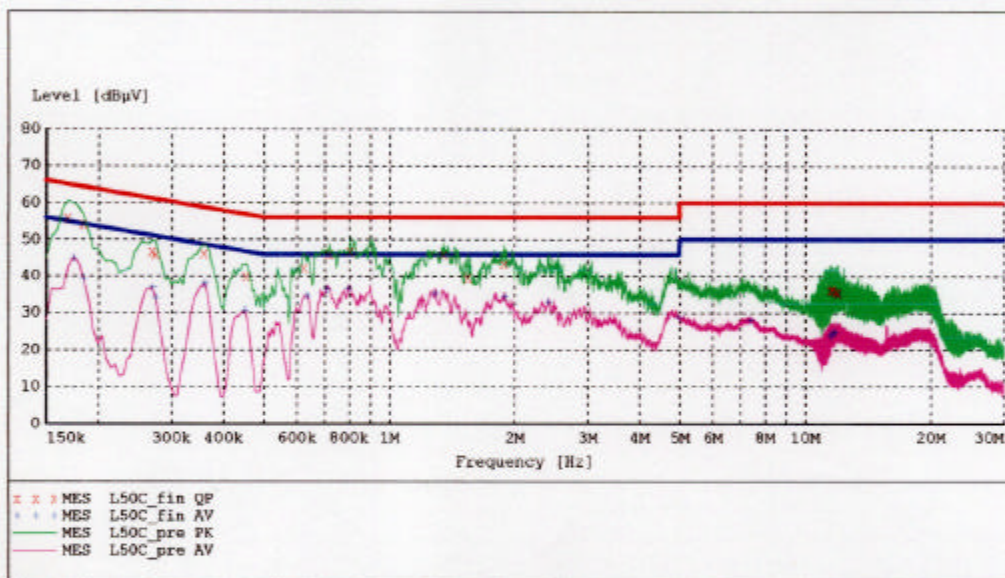
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.170000	48.90	0.5	55	6.0	1	---
0.185000	39.10	0.5	54	15.1	1	---
0.265000	41.40	0.5	51	9.9	1	---
0.330000	33.30	0.5	50	16.2	1	---
0.355000	37.20	0.5	49	11.6	1	---
0.435000	31.10	0.5	47	16.1	1	---
0.705000	39.10	0.5	46	6.9	1	---
0.795000	39.60	0.5	46	6.4	1	---
1.330000	38.00	0.5	46	8.0	1	---
1.850000	35.80	0.6	46	10.2	1	---
2.395000	34.20	0.6	46	11.8	1	---
3.465000	32.30	0.7	46	13.7	1	---
5.000000	25.70	0.9	46	20.3	1	---
7.620000	29.30	1.1	50	20.7	1	---
11.380000	31.50	1.3	50	18.5	1	---
12.350000	25.30	1.4	50	24.7	1	---
15.730000	26.10	1.5	50	23.9	1	---
19.445000	22.40	1.8	50	27.6	1	---

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

EUT: L50C
 Manufacturer: IMAGEQUEST
 Operating Condition: 1024 X 768 60KHz 75Hz
 Test Site: Shield Room
 Operator:
 Test Specification:
 Comment: H
 Start of Test: 10/21/01 / 5:40:10PM

SCAN TABLE:

Short Description:		EN 55022 Voltage		Detector	Meas. Time	IF Bandw.	Transducer
Start Frequency	Stop Frequency	Step Width					
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)	
			Average				
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)	
			Average				


MEASUREMENT RESULT: "L50C_fin QP"

10/21/01 5:44PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.170000	56.00	0.5	65	9.0	1	---
0.185000	54.30	0.5	64	10.0	1	---
0.270000	46.80	0.5	61	14.3	1	---
0.275000	45.90	0.5	61	15.0	1	---
0.360000	46.20	0.5	59	12.5	1	---
0.455000	39.90	0.5	57	16.9	1	---
0.625000	42.30	0.5	56	13.7	1	---
0.720000	46.10	0.5	56	9.9	1	---
0.810000	46.80	0.5	56	9.2	1	---
1.355000	45.90	0.5	56	10.1	1	---
1.550000	39.60	0.5	56	16.4	1	---
1.895000	43.40	0.6	56	12.6	1	---
11.545000	36.20	1.4	60	23.8	1	---
11.610000	36.40	1.4	60	23.6	1	---

MEASUREMENT RESULT: "L50C_fin QP"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
11.640000	36.50	1.4	60	23.5	1	---
11.875000	35.90	1.4	60	24.1	1	---
11.965000	35.70	1.4	60	24.3	1	---
12.045000	35.50	1.4	60	24.5	1	---

MEASUREMENT RESULT: "L50C_fin AV"

10/21/01 5:44PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.175000	45.00	0.5	55	9.7	1	---
0.185000	39.30	0.5	54	14.9	1	---
0.270000	37.00	0.5	51	14.1	1	---
0.275000	34.30	0.5	51	16.6	1	---
0.360000	38.00	0.5	49	10.8	1	---
0.450000	30.90	0.5	47	15.9	1	---
0.635000	34.80	0.5	46	11.2	1	---
0.710000	36.50	0.5	46	9.5	1	---
0.800000	36.80	0.5	46	9.2	1	---
1.290000	35.40	0.5	46	10.6	1	---
1.895000	34.60	0.6	46	11.4	1	---
2.420000	33.10	0.6	46	12.9	1	---
5.000000	28.90	0.9	46	17.1	1	---
7.425000	28.10	1.1	50	21.9	1	---
11.535000	23.70	1.4	50	26.3	1	---
11.650000	24.30	1.4	50	25.7	1	---
11.750000	24.70	1.4	50	25.3	1	---
11.865000	24.90	1.4	50	25.1	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 : 35 % Temperature : 28
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : OCTOBER 19, 2001
 Result : PASSED BY 3.2dB

EUT : 15" LCD MONITOR
 Operating Condition : 1024X768 (Hf : 60 kHz, Vf : 75 Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
66.5	15.11	6.39	1.70	V	23.2	30.0	-6.8
134.0	8.72	14.28	2.50	H	25.5	30.0	-4.5
140.0	9.03	14.57	2.50	V	26.1	30.0	-3.9
147.5	2.92	14.68	2.50	V	20.1	30.0	-9.9
154.2	9.43	14.77	2.60	H	26.8	30.0	-3.2
175.1	8.75	15.05	2.70	V	26.5	30.0	-3.5
200.8	5.12	15.78	3.00	V	23.9	30.0	-6.1
210.2	6.20	16.20	3.20	V	25.6	30.0	-4.4
403.3	12.75	16.55	4.20	H	33.5	37.0	-3.5
525.8	7.65	18.95	5.10	H	31.7	37.0	-5.3
679.8	5.31	22.29	6.00	H	33.6	37.0	-3.4
769.0	1.57	22.73	6.50	V	30.8	37.0	-6.2

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.

Measured by Kyoung-Houn SEO / Engineer

Date : OCTOBER 19, 2001

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

TYPE		MANUFACTURE		MODEL	
CAL. DATE					
EMI Test Receiver		Rohde & Schwarz	ESH3	2001.6.29	
EMI Test Receiver		Rohde & Schwarz	ESVP	2001.2.14	
EMI Test Receiver		Rohde & Schwarz	ESI40	2001.1.18	
EMI Test Receiver		Rohde & Schwarz	ESVS30	2001.6.26	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		2001.7.13	
LISN	Rohde & Schwarz	ESH2-Z5		2001.7.14	
Amplifier	Hewlett-Packard	8447E		2001.3.2	
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	2001.2.20	
Reference Network Impedance	Voltech		IEC 555	N.A	
AC Power Source	PACIFIC		Magnetic Module	N.A	
AC Power Source	PACIFIC		360AMX	N.A	