

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;

HYUNDAI IMAGEQUEST CO., LTD.
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI,
KYOUNKI-DO, 467-701, KOREA

Date of Issue: AUGUST 27, 2001

Test Report No.: HCT-F01-0802

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

FCC ID :

PJIL510

MODEL / TYPE :

L510

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, 20-pin DVI-D (Digital RGB)

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 GTech. 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 L510 (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. $\geq$ 1MHz)	16MHz , 20MHz
POWER REQUIREMENT	DC 12V/5V----- 2.0A/2.0A
NUMBER OF LAYERS	MAIN BOARD 4 LAYER OSD BOARD 1 LAYER CONNECTOR BOARD 2 LAYER POWER BOARD 1 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1024X768 (@60KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31KHz 60KHz
V-SYNC FREQUENCY RANGE	56Hz 75Hz
LCD TYPE	15" (LCD Type NO : L150X1M)

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.	L510	PJIL510	HOST
PC(HOST)	COMPAQ	PD1000	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	C 2000 TECHNOLOGIES CO.,LTD.	N625	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 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.	3041001037
POWER BOARD	C&C TECH...	361020008701
OSD BOARD	ImageQuest CO., Ltd.	301070073202
INVERTOR BOARD	ImageQuest CO., Ltd.	3610400243
LCD BOARD	ACER.CO.,LTD	L150X1M

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)

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	Y	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

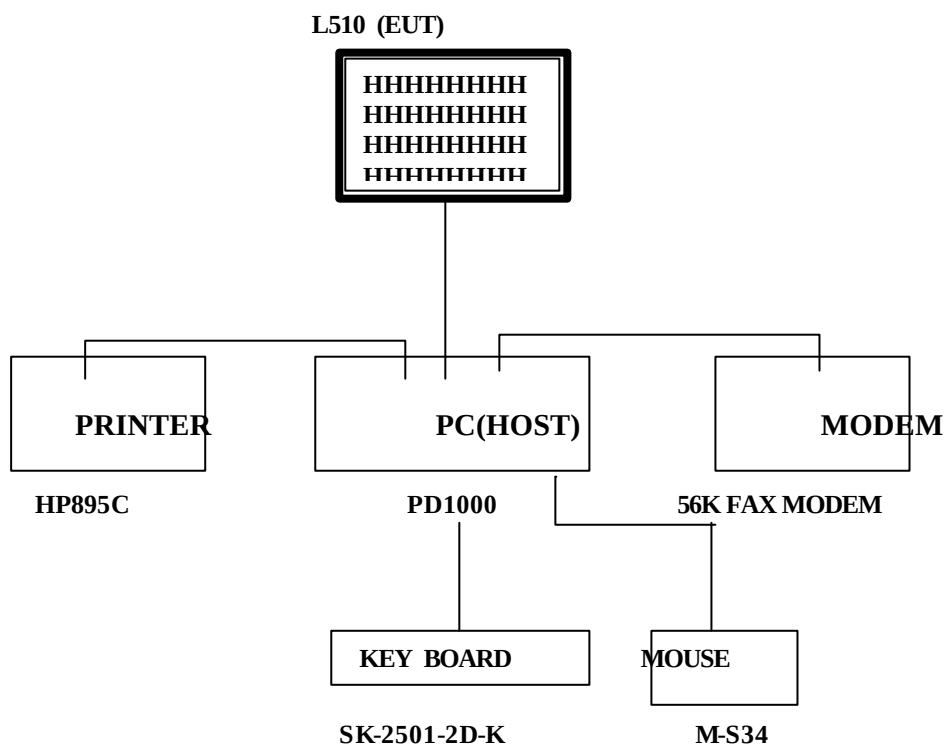
N/A

2.6 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN.
Preliminary Powerline 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 (46.9 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 (46.9 KHz/75Hz)	
	640 x 480 (31.5KHz/60Hz)	

NOTE:

The monitor(EUT) has video interface ports{15-pin D-sub VGA connector, 20-pin DVI-D (Digital RGB)} to support two 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 Kyoung-Houn SEO / Engineer

Date : AUGUST 1 , 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 : 36% Temperature : 26
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : AUGUST 6, 2001
 Result : PASSED BY -10.1 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
2.405	35.9	HOT	46.0	-10.1	Average
2.345	44.3	HOT	56.0	-11.7	Quasi-Peak
2.420	43.5	NEUTRAL	56.0	-12.5	Quasi-Peak
1.994	33.1	HOT	46.0	-12.9	Average

Measured by : Kyoung-Houn SEO / Engineer

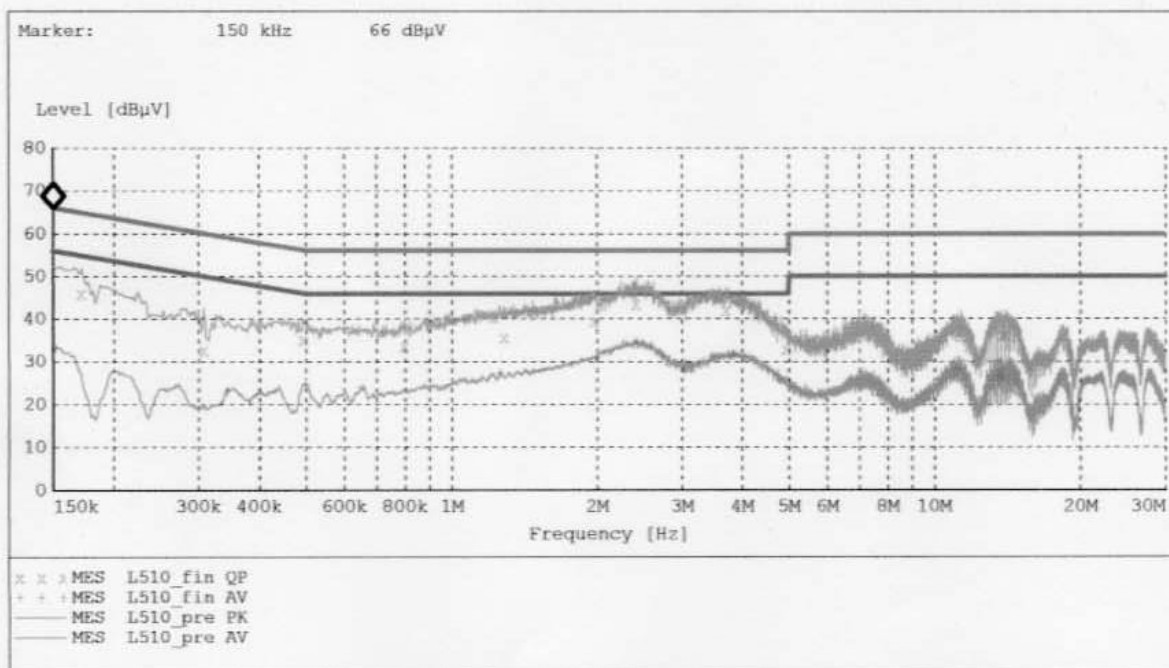
Date : AUGUST 6 , 2001

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

EUT: L510
 Manufacturer:
 Operating Condition:
 Test Site: Shield Room
 Operator:
 Test Specification: CISPR22 Class B
 Comment: N(110)
 Start of Test: 8/6/01 / 4:36:07PM

SCAN TABLE: "EN 55022 Voltage"

Short Description: EN 55022 Voltage			Detector	Meas. Time	IF Bandw.	Transducer
Start Frequency	Stop Frequency	Step Width				
150.0 kHz	2.0 MHz	2.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			
2.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			


MEASUREMENT RESULT: "L510_fin QP"

8/6/01 4:40PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.172000	45.90	0.5	65	18.9	1	---
0.308000	32.70	0.5	60	27.3	1	---
0.494000	35.10	0.5	56	21.0	1	---
0.800000	33.50	0.5	56	22.5	1	---
1.286000	35.70	0.5	56	20.3	1	---
1.976000	39.40	0.6	56	16.6	1	---
2.420000	43.50	0.6	56	12.5	1	---
3.720000	41.90	0.7	56	14.1	1	---
4.935000	33.00	0.9	56	23.0	1	---
11.350000	35.80	1.3	60	24.2	1	---
13.755000	36.10	1.5	60	23.9	1	---
14.040000	36.30	1.5	60	23.7	1	---

MEASUREMENT RESULT: "L510_fin AV"

8/6/01 4:40PM

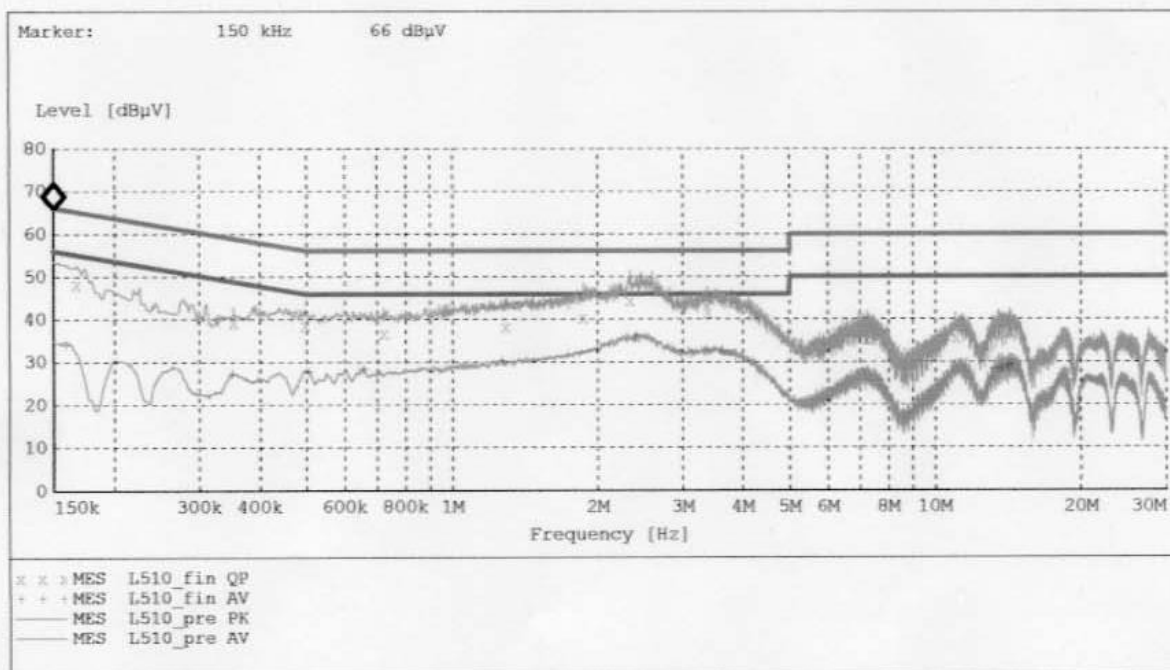
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.152000	33.20	0.5	56	22.7	1	---
0.344000	23.20	0.5	49	25.9	1	---
0.500000	24.80	0.5	46	21.2	1	---
0.656000	24.10	0.5	46	21.9	1	---
1.266000	27.40	0.5	46	18.6	1	---
1.996000	31.10	0.6	46	14.9	1	---
2.420000	34.30	0.6	46	11.7	1	---
3.825000	31.50	0.7	46	14.5	1	---
11.195000	28.30	1.3	50	21.7	1	---
13.540000	26.90	1.4	50	23.1	1	---
13.745000	26.90	1.5	50	23.1	1	---
13.755000	26.90	1.5	50	23.1	1	---

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

EUT: L510
 Manufacturer:
 Operating Condition:
 Test Site: Shield Room
 Operator:
 Test Specification: CISPR22 Class B
 Comment: H(110)
 Start of Test: 8/6/01 / 4:30:29PM

SCAN TABLE: "EN 55022 Voltage"

Short Description: EN 55022 Voltage			Detector	Meas. Time	IF Bandw.	Transducer
Start Frequency	Stop Frequency	Step Width				
150.0 kHz	2.0 MHz	2.0 kHz	MaxPeak	100.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			
2.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	CABLE LOSS (NEW)
			Average			


MEASUREMENT RESULT: "L510_fin QP"

8/6/01 4:35PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.168000	48.20	0.5	65	16.8	1	---
0.354000	39.20	0.5	59	19.7	1	---
0.498000	38.50	0.5	56	17.6	1	---
0.726000	36.70	0.5	56	19.3	1	---
1.296000	38.30	0.5	56	17.7	1	---
1.872000	40.40	0.6	56	15.6	1	---
2.345000	44.30	0.6	56	11.7	1	---
3.395000	41.40	0.7	56	14.6	1	---
7.250000	35.20	1.1	60	24.8	1	---
11.065000	35.70	1.3	60	24.3	1	---
13.585000	36.50	1.4	60	23.5	1	---
14.320000	36.90	1.5	60	23.1	1	---

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MEASUREMENT RESULT: "L510_fin AV"

8/6/01 4:35PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.160000	34.00	0.5	56	21.4	1	---
0.352000	27.40	0.5	49	21.5	1	---
0.506000	27.90	0.5	46	18.1	1	---
0.658000	28.40	0.5	46	17.6	1	---
1.268000	30.50	0.5	46	15.5	1	---
1.994000	33.10	0.6	46	12.9	1	---
2.405000	35.90	0.6	46	10.1	1	---
3.625000	32.50	0.7	46	13.5	1	---
13.535000	28.40	1.4	50	21.6	1	---
13.750000	28.70	1.5	50	21.3	1	---
14.160000	29.20	1.5	50	20.8	1	---
14.395000	29.50	1.5	50	20.5	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 : 32 % Temperature : 26
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : AUGUST 10, 2001
 Result : PASSED BY -3.0dB

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 dB	Margin dB
100.9	13.79	10.61	2.10	V	26.5	30.0	-3.5
158.3	5.53	14.77	2.60	V	22.9	30.0	-7.1
161.0	9.50	14.80	2.70	H	27.0	30.0	-3.0
192.7	8.37	15.43	3.00	V	26.8	30.0	-3.2
203.5	7.69	15.91	3.00	H	26.6	30.0	-3.4
210.2	4.90	16.20	3.20	V	24.3	30.0	-5.7
217.7	5.96	16.64	3.30	H	25.9	30.0	-4.1
223.1	5.72	17.08	3.30	H	26.1	30.0	-3.9
543.3	8.66	19.14	5.30	H	33.1	37.0	-3.9
750.2	2.85	22.55	6.50	V	31.9	37.0	-5.1
832.0	1.48	23.12	6.90	V	31.5	37.0	-5.5
865.3	-0.35	23.65	6.90	V	30.2	37.0	-6.8

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 : AUGUST 10 , 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