

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

PRODUCT COMPLIANCE TEAM
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
TEL : +82 31 639 8518 FAX : +82 31 639 8525 www.hctec.co.kr

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: DECEMBER 16, 2002

Test Report No.: HCT-F02-1202

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

HCT FRN : 0005-8664-21

CERTIFICATION (Permissive change class II)

FCC ID:

**PJ1Q15
L15A0C060**

MODEL / TYPE:

FCC Rule Part(s):

Part 15 & 2

Classification:

FCC Class B Computing Device Peripheral (JBP)

Standard(s):

FCC Class B: 1998 (CISPR 22)

Equipment(EUT) Type:

15" LCD Monitor

Max Resolution:

1024 X 768 (@60KHz/ 75Hz)

Port/ Connector(s)

15-pin D-sub VGA connector

LCD PANEL:

AU Optronics Corporation. (M150XN05)

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 Q15 (referred to as the EUT in this report) is a 15" LCD Monitor HOR. Freq. 60KHz w/max. Resolution of 1024 X 768 . 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 $\overline{\text{---}}$ 2.0A / 2.0A
NUMBER OF LAYERS	MAIN BOARD 2 LAYER OSD BOARD 2 LAYER POWER BOARD 2 LAYER INVERTER BOARD 2 LAYER
MAX. RESOLUTION	1024 X 768 (@60KHz/ 75 Hz)
H-SYNC FREQUENCY RANGE	31.0KHz ~ 60.0KHz
V-SYNC FREQUENCY RANGE	56Hz ~ 75Hz
LCD TYPE	15" (LCD Type NO : M150XN05)

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.	Q15	PJIQ15	HOST
PC(HOST)	H/P	KR20803647	DoC	N/A
VIDEO CARD	NVIDIA	NVIDIA GeForce MX 200	DoC	HOST
KEY BOARD	H/P	BF12502086	DoC	HOST
MOUSE	M/S	Intellimouse optical USB and PS/2 compatible	DoC	HOST
PRINTER	H/P	C6410A	DoC	HOST
MODEM	3COM	56K FAX MODEM	DoC	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.	3041001038
POWER BOARD	C&C TECH CO.,LTD.	361020008703
OSD BOARD	ImageQuest CO., Ltd.	3010700802
INVERTOR BOARD	ImageQuest CO., Ltd	3610400254
LCD BOARD	AU Optronics Corporation	M150XN05

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)
MONITOR(EUT)	N	Y	1.8(P), 1.5(D), 1.5(D)
PC(HOST)	N	N/A	1.8(P)
KEY BOARD	N/A	Y	2.0(D)
MOUSE	N/A	Y	1.8(D)
MODEM	N	Y	2.0(P),0.8(D)
PRINTER	N	Y	2.0(P),1.8(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	BOTH END	Y	BOTH END
KEY BOARD	N	N/A	Y	PC END
MOUSE	Y	PC END	Y	PC END
MODEM	N	N/A	Y	BOTH END
PRINTER	N	N/A	Y	BOTH END

2.5 Equipment Modifications

N/A

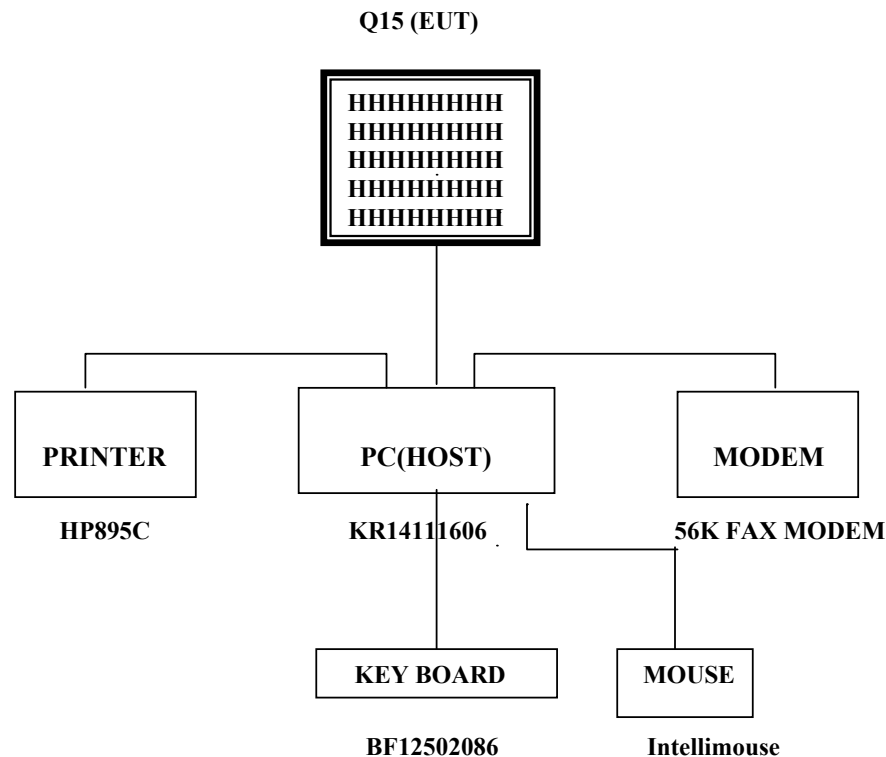
2.6 Configuration of Test system

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

Tested by Kyoung-Houn SEO / Engineer

Date : NOVEMBER 25, 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 : 39% Temperature : 21°C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : NOVEMBER 28, 2002
 Result : PASSED BY 5.6 dB
 EUT : 15" LCD MONITOR

Operating Condition : 1024 X 768 (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
3.320	40.4	NEUTRAL	46.0	5.6	Average
3.165	39.9	HOT	46.0	6.1	Average
3.415	38.8	NEUTRAL	46.0	7.2	Average
3.430	37.0	HOT	46.0	9.0	Average

Measured by : Kyoung-Houn SEO / Engineer

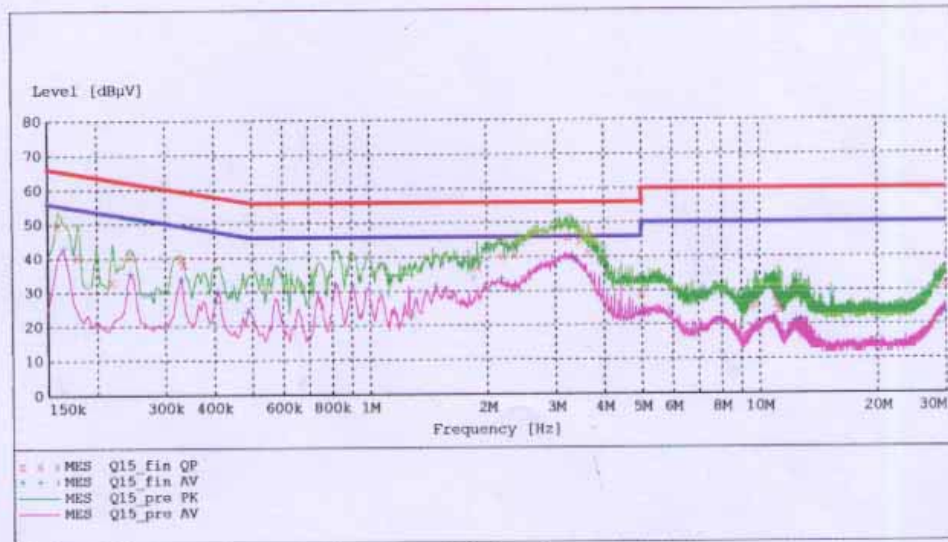
Date : NOVEMBER 28, 2002

HYUNDAI C TECH
EMC Testing Laboratory

EUT: Q15
Manufacturer: IMAGEQUEST
Operating Condition: 1024 X 768 75Hz
Test Site: SHIELD ROOM
Operator: KH-SEO
Test Specification: EN55022 CLASS B
Comment: N
Start of Test: 11/28/02 / 1:06:10PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			

**MEASUREMENT RESULT: "Q15_fin QP"**

11/28/02 1:10PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.160000	49.50	10.1	66	16.0	1	---
0.180000	40.50	10.1	65	24.0	1	---
0.220000	33.20	10.1	63	29.6	1	---
0.245000	40.90	10.1	62	21.0	1	---
0.330000	39.80	10.1	60	19.7	1	---
0.335000	38.40	10.1	59	20.9	1	---
1.900000	37.10	10.3	56	18.9	1	---
2.205000	40.40	10.3	56	15.6	1	---
2.370000	40.70	10.3	56	15.3	1	---
3.245000	46.10	10.2	56	9.9	1	---
3.470000	44.40	10.2	56	11.6	1	---
3.660000	41.10	10.2	56	14.9	1	---
5.000000	29.00	10.3	56	27.0	1	---
9.780000	25.70	10.4	60	34.3	1	---

MEASUREMENT RESULT: "Q15_fin QP"
(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
10.985000	28.50	10.4	60	31.5	1	---
11.180000	26.20	10.4	60	33.8	1	---
11.295000	24.40	10.4	60	35.6	1	---
29.900000	32.30	10.6	60	27.7	1	---

MEASUREMENT RESULT: "Q15_fin AV"
11/28/02 1:10PM

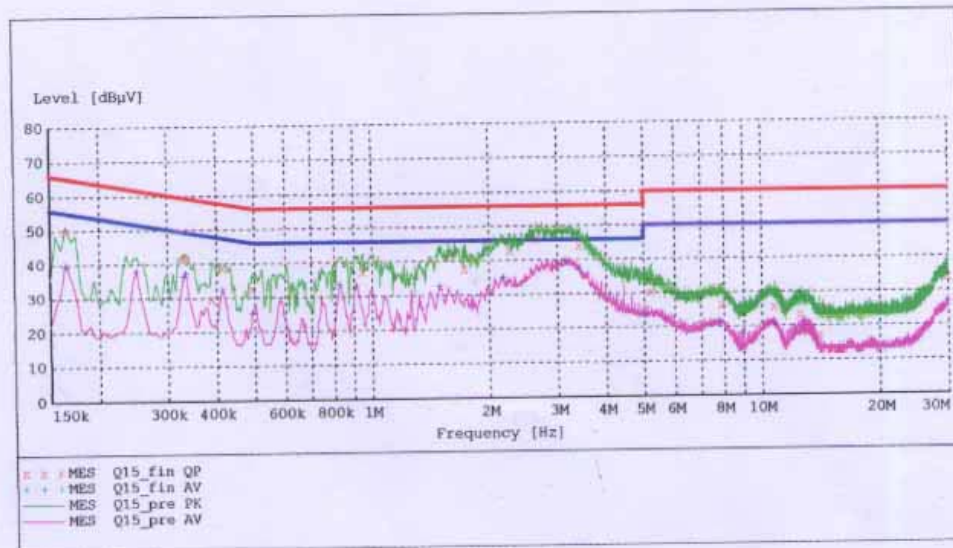
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.165000	43.10	10.1	55	12.1	1	---
0.245000	35.70	10.1	52	16.2	1	---
0.330000	33.90	10.1	50	15.5	1	---
0.405000	27.30	10.1	48	20.4	1	---
0.410000	30.30	10.1	48	17.3	1	---
0.490000	24.30	10.1	46	21.8	1	---
0.820000	32.00	10.2	46	14.0	1	---
0.905000	32.20	10.1	46	13.8	1	---
1.480000	31.60	10.2	46	14.4	1	---
2.185000	33.80	10.3	46	12.2	1	---
3.320000	40.40	10.2	46	5.6	1	---
3.415000	38.80	10.2	46	7.2	1	---
5.000000	23.30	10.3	46	22.7	1	---
8.015000	21.10	10.4	50	28.9	1	---
10.920000	21.90	10.4	50	28.1	1	---
12.440000	21.30	10.4	50	28.7	1	---
12.820000	21.50	10.5	50	28.5	1	---
29.835000	24.60	10.6	50	25.4	1	---

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EMC Testing Laboratory

EUT: Q15
 Manufacturer: IMAGEQUEST
 Operating Condition: 1024 X 768 75Hz
 Test Site: SHIELD ROOM
 Operator: KH-SEO
 Test Specification: EN55022 CLASS B
 Comment: H
 Start of Test: 11/28/02 / 1:11:35PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			


MEASUREMENT RESULT: "Q15_fin QP"

11/28/02 1:15PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.165000	49.80	10.1	65	15.4	1	---
0.330000	42.00	10.1	60	17.4	1	---
0.335000	41.90	10.1	59	17.4	1	---
0.390000	29.80	10.1	58	28.3	1	---
0.415000	38.80	10.1	58	18.7	1	---
0.495000	32.50	10.1	56	23.6	1	---
0.950000	37.00	10.1	56	19.0	1	---
1.580000	41.20	10.2	56	14.8	1	---
1.735000	37.70	10.2	56	18.3	1	---
2.275000	42.90	10.3	56	13.1	1	---
2.650000	46.20	10.3	56	9.8	1	---
3.435000	44.20	10.2	56	11.8	1	---
5.230000	30.60	10.3	60	29.4	1	---
7.930000	26.40	10.4	60	33.6	1	---

MEASUREMENT RESULT: "Q15_fin QP"
(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
10.810000	25.70	10.4	60	34.3	1	---
12.595000	23.50	10.4	60	36.5	1	---
14.080000	17.20	10.5	60	42.8	1	---
29.975000	34.20	10.6	60	25.8	1	---

MEASUREMENT RESULT: "Q15_fin AV"

11/28/02 1:15PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.165000	39.50	10.1	55	15.7	1	---
0.250000	38.30	10.1	52	13.4	1	---
0.330000	36.30	10.1	50	13.1	1	---
0.335000	37.20	10.1	49	12.1	1	---
0.415000	32.60	10.1	48	14.9	1	---
0.495000	25.50	10.1	46	20.5	1	---
0.830000	33.70	10.1	46	12.3	1	---
0.915000	33.30	10.1	46	12.7	1	---
1.495000	33.00	10.2	46	13.0	1	---
2.185000	35.30	10.3	46	10.7	1	---
3.165000	39.90	10.2	46	6.1	1	---
3.430000	37.00	10.2	46	9.0	1	---
5.000000	24.00	10.3	46	22.0	1	---
7.785000	22.10	10.4	50	27.9	1	---
8.925000	18.10	10.4	50	31.9	1	---
10.755000	20.70	10.4	50	29.3	1	---
12.915000	21.80	10.5	50	28.2	1	---
29.975000	26.70	10.6	50	23.3	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 : 44 % Temperature : 20 °C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : DECEMBER 3, 2002
 Result : PASSED BY -3.0dB

EUT : 15" LCD MONITOR
 Operating Condition : 1024 X 768 (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
74.6	17.89	5.91	1.80	V	25.6	30.0	-4.4
144.8	5.96	14.64	2.50	V	23.1	30.0	-6.9
156.9	7.43	14.77	2.60	V	24.8	30.0	-5.2
169.1	7.90	14.90	2.70	V	25.5	30.0	-4.5
201.5	8.17	15.83	3.00	H	27.0	30.0	-3.0
229.8	4.21	17.19	3.30	V	24.7	30.0	-5.3
382.3	11.76	16.54	4.20	V	32.5	37.0	-4.5
408.5	10.04	16.66	4.20	H	30.9	37.0	-6.1
433.0	10.23	17.07	4.50	V	31.8	37.0	-5.2
454.0	10.85	17.75	4.70	V	33.3	37.0	-3.7
461.0	7.04	17.86	4.80	V	29.7	37.0	-7.3
487.3	9.85	18.15	4.80	V	32.8	37.0	-4.2

NOTE:

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

Measured by Kyoung-Houn SEO / Engineer

Date : DECEMBER 3 , 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	2002.6.29
EMI Test Receiver	Rohde & Schwarz	ESVP	2002.2.14
EMI Test Receiver	Rohde & Schwarz	ESI40	2002.2.28
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	2002.7.11
LISN	EMCO	3825/2	2002.2.7
LISN	Rohde & Schwarz	ESH2-Z5	2002.8.12
Amplifier	Hewlett-Packard	8447E	2002.3.2
Dipole Antennas	Rohde & Schwarz	VHAP	2002.6.28
Dipole Antennas	Rohde & Schwarz	UHAP	2002.6.28
Biconical Antenna	Rohde & Schwarz	BBA-9106	2002.6.28
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2002.6.26
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