

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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CERTIFICATION

Manufacture;
HYUNDAI NETWORKS, Inc.
San 136-1 Ami-ri Bubal-eup, Icheon-si
Kyoungki-Do KOREA
FRN : 0007-4654-61

Date of Issue: JULY 30, 2002
Test Report No.: HCT-F02-0705
Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.
FRN : 0005-8664-21

FCC ID :

QJUHASU-240

MODEL / TYPE :

HASU-240

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:	ADSL Modem
Data Transmission Speed:	Upstream: max 800 Kbps
(ADSL Modem)	Downstream: max 8,000 Kbps
Port:	Line :1port, USB:1port

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).

M. S. O.

Report prepared by :
Manager of EMC Test



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1. GENERAL INFORMATION

1.1 Product Description

Hyundai Networks, Inc. Model HASU-240 (referred to as the EUT in this report) is a ADSL Modem. Product specification information described herein was obtained from product data sheet or user's manual.

ADSL Standard	ANSI T1, 413i2, G, 992, 1(G.DMT), G.992.2(G.Lite)
ADSL Chipset	Globe Span
Performance	Upstream : 800Kbps Downstream : 8000Kbps
Interface	USB Rev 1.1, RJ-11
ATM Connection	VPI Range : 0-16 VCI Range : 0-4095
POWER Supply	USB Power (+3.1V and +5VDC)
LIST OF EACH OSC. OR XTAL. FREQ.(FREQ. 1MHz)	48MHz, 17.280MHz

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 NAME	FCC ID / DoC	CONNECTED TO
ADSL MODEM (EUT)	Hyundai Networks, Inc	HASU-240	QJUHASU-240	NOTE BOOK
NOTE BOOK	COMPAQ	CM2080	DOC	EUT
ADSL SYSTEM	Hyundai Networks, Inc	DSL6-6ADI	DOC	EUT
PRINTER	H.P	C6410A	DOC	NOTE BOOK

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	Hyundai Networks, Inc.	HASU-240 Rev 1.0

2.2 EUT exercise Software

The EUT was tested on the Link mode 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)
ADSL MODEM (EUT) USB Port	N/A	Y	1.5(D)
ADSL MODEM (EUT) RJ-11 Port	N/A	N	3.0(D)
NOTE BOOK	N	N/A	1.8(P)
ADSL SYSTEM	N	N	1.5(P),3.0(D)
PRINTER	N	Y	1.8(P), 2.0(D)

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

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
ADSL MODEM (EUT) USB Port	N	N/A	Y	BOTH END
ADSL MODEM (EUT) RJ-11 Port	N	N/A	N	BOTH END
NOTE BOOK	N	N/A	N/A	N/A
ADSL SYSTEM	N	N/A	N	N/A
PRINTER	N	N/A	Y	BOTH END

2.5 Equipment Modifications

N/A

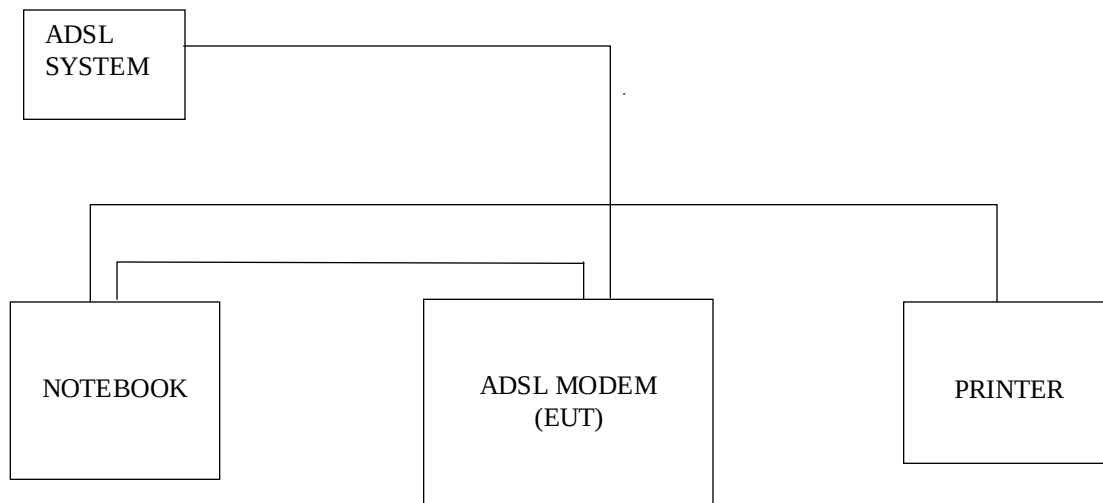
2.6 Configuration of Test system

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, Link Mode were investigated and RJ 11 cable is connected to the ADSL Modem (EUT)

3.2 Radiated Emission Tests

During Preliminary Tests, Link Mode were investigated and RJ 11 cable is connected to the ADSL Modem (EUT)

Tested by Jin Pyo Hong / Engineer

Date : JULY 18, 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 : 35 % Temperature : 29
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JULY 29, 2002
 Result : PASSED BY 3.2dB
 EUT : ADSL MODEM

Operating Condition : LINK MODE

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
12.335	47.40	NEUTRAL	60.0	12.6	Quasi-Peak
12.340	47.70	HOT	60.0	12.3	Quasi-Peak
13.065	44.90	HOT	60.0	15.1	Quasi-Peak
14.150	45.30	NEUTRAL	60.0	14.7	Quasi-Peak
12.335	46.2	NEUTRAL	50.0	3.8	Average
12.340	46.8	HOT	50.0	3.2	Average
13.065	43.5	HOT	50.0	6.5	Average
14.150	43.5	NEUTRAL	50.0	6.5	Average



Measured by : Jin Pyo Hong / Engineer

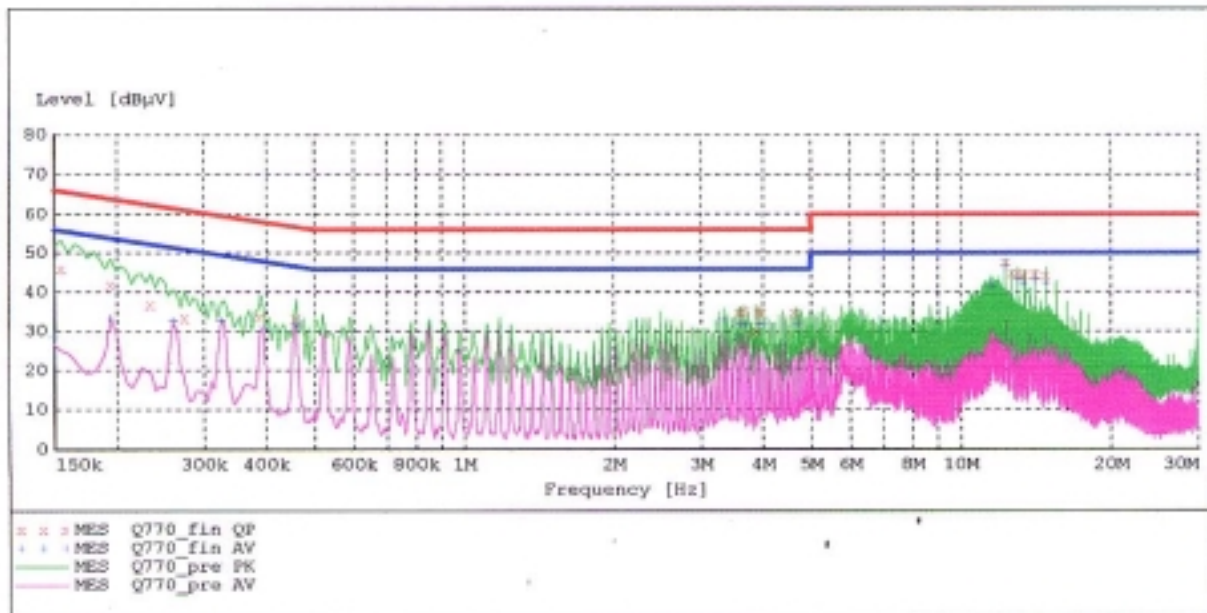
Date : JULY 29, 2002

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

EUT: HASU-240
 Manufacturer: HYUNAI NETWORKS, INC.
 Operating Condition: NORMAL
 Test Site: Shield Room
 Operator: JP-HONG
 Test Specification: CISPR 22 CLASS B
 Comment: H
 Start of Test: 7/29/02 / 1:50:54PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:		EN 55022 Voltage					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
Frequency 150.0 kHz	Frequency 500.0 kHz	Width 5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR	
			Average				
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR	
			Average				


MEASUREMENT RESULT: "Q770_fin QP"

7/29/02 1:55PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.155000	46.10	0.1	66	19.7	---	---
0.195000	41.80	0.2	64	22.0	---	---
0.235000	36.90	0.2	62	25.4	---	---
0.275000	33.40	0.2	61	27.5	---	---
0.390000	33.60	0.2	58	24.4	---	---
0.460000	33.40	0.2	57	23.3	---	---
3.600000	35.00	0.4	56	21.0	---	---
3.670000	35.20	0.4	56	20.8	---	---
3.870000	30.10	0.4	56	25.9	---	---
3.930000	35.00	0.4	56	21.0	---	---
3.995000	34.90	0.4	56	21.1	---	---
4.650000	34.90	0.4	56	21.1	---	---
12.340000	47.70	0.7	60	12.3	---	---
12.705000	44.90	0.8	60	15.1	---	---

MEASUREMENT RESULT: "Q770_fin QP"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
13.065000	44.90	0.8	60	15.1	----	----
13.430000	44.40	0.8	60	15.6	----	----
14.155000	44.60	0.8	60	15.4	----	----
14.880000	44.30	0.9	60	15.7	----	----

MEASUREMENT RESULT: "Q770_fin AV"

7/29/02 1:55PM

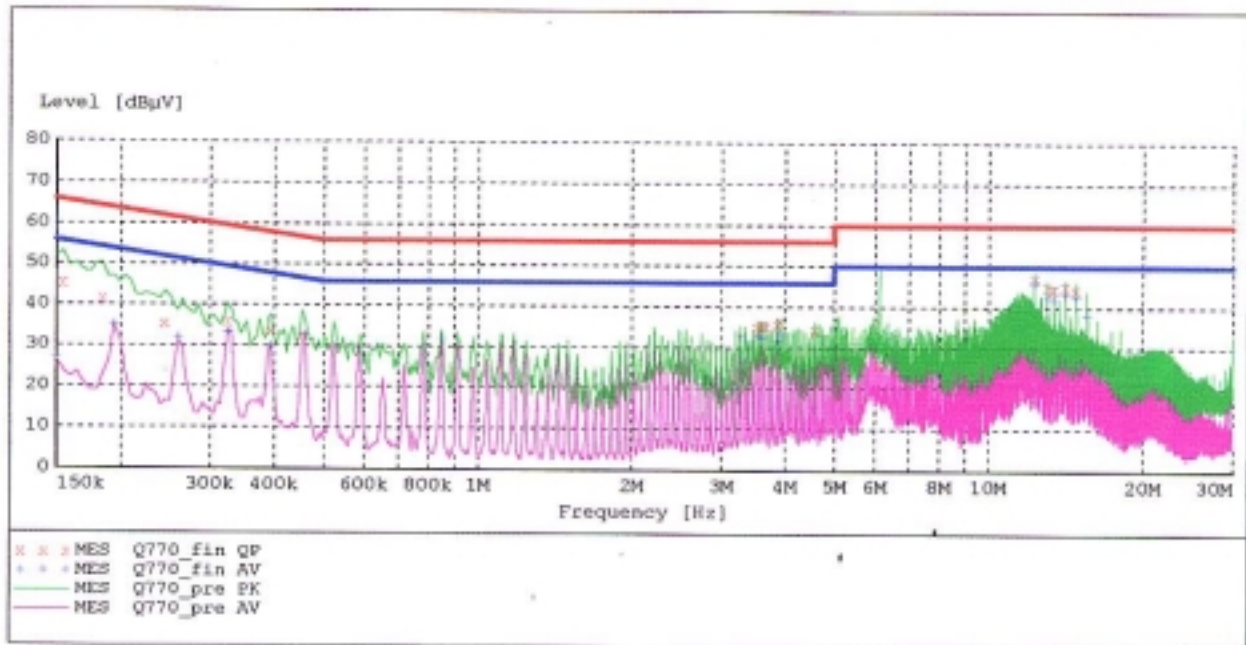
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150000	28.50	0.1	56	27.5	----	----
0.195000	33.30	0.2	54	20.5	----	----
0.260000	32.70	0.2	51	18.7	----	----
0.325000	32.70	0.2	50	16.8	----	----
0.395000	31.20	0.2	48	16.7	----	----
0.460000	31.80	0.2	47	14.9	----	----
3.340000	33.20	0.4	46	12.8	----	----
3.600000	32.10	0.4	46	13.9	----	----
3.670000	32.10	0.4	46	13.9	----	----
3.930000	31.90	0.4	46	14.1	----	----
3.995000	32.20	0.4	46	13.8	----	----
4.715000	32.30	0.4	46	13.7	----	----
11.615000	41.60	0.7	50	8.4	----	----
12.340000	46.80	0.7	50	3.2	----	----
13.065000	43.50	0.8	50	6.5	----	----
13.430000	42.40	0.8	50	7.6	----	----
14.155000	43.40	0.8	50	6.6	----	----
14.880000	42.40	0.9	50	7.6	----	----

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

EUT: HASU-240
 Manufacturer: HYUNAI NETWORKS, INC.
 Operating Condition: NORMAL
 Test Site: Shield Room
 Operator: JP-HONG
 Test Specification: CISPR 22 CLASS B
 Comment: N
 Start of Test: 7/29/02 / 1:44:51PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency 150.0 kHz	Frequency 500.0 kHz	Width 5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			


MEASUREMENT RESULT: "Q770_fin QP"

7/29/02 1:49PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.155000	45.30	0.1	66	20.5	---	---
0.185000	41.60	0.2	64	22.6	---	---
0.245000	35.50	0.2	62	26.4	---	---
0.325000	36.00	0.2	60	23.5	---	---
0.395000	33.70	0.2	58	24.3	---	---
0.455000	33.00	0.2	57	23.8	---	---
3.535000	35.30	0.4	56	20.7	---	---
3.605000	35.60	0.4	56	20.4	---	---
3.670000	35.40	0.4	56	20.6	---	---
3.865000	35.80	0.4	56	20.2	---	---
3.930000	36.50	0.4	56	19.5	---	---
4.585000	34.60	0.4	56	21.4	---	---
6.130000	25.90	0.5	60	34.1	---	---
12.335000	47.40	0.7	60	12.6	---	---

MEASUREMENT RESULT: "Q770_fin QP"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
13.060000	45.20	0.8	60	14.8	---	---
13.425000	44.70	0.8	60	15.3	---	---
14.150000	45.30	0.8	60	14.7	---	---
14.875000	44.50	0.9	60	15.5	---	---

MEASUREMENT RESULT: "Q770_fin AV"

7/29/02 1:49PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150000	27.40	0.1	56	28.6	---	---
0.195000	35.20	0.2	54	18.6	---	---
0.260000	32.10	0.2	51	19.3	---	---
0.325000	33.50	0.2	50	16.1	---	---
0.395000	29.80	0.2	48	18.2	---	---
0.460000	32.90	0.2	47	13.8	---	---
0.850000	32.20	0.2	46	13.8	---	---
3.275000	33.10	0.4	46	12.9	---	---
3.535000	33.00	0.4	46	13.0	---	---
3.605000	32.50	0.4	46	13.5	---	---
3.865000	32.00	0.4	46	14.0	---	---
3.930000	33.50	0.4	46	12.5	---	---
12.335000	46.20	0.7	50	3.8	---	---
13.060000	43.10	0.8	50	6.9	---	---
13.425000	42.30	0.8	50	7.7	---	---
14.150000	43.50	0.8	50	6.5	---	---
14.875000	42.80	0.9	50	7.2	---	---
15.600000	38.60	0.9	50	11.4	---	---

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 : 29
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : JULY, 29, 2002
 Result : PASSED BY -3.4 dB
 EUT : ADSL MODEM

Operating Condition : LINK MODE

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
36.1	6.86	17.49	1.00	V	25.4	30.0	-4.7
48.0	12.11	12.59	1.40	V	28.1	30.0	-3.9
66.2	15.71	6.39	1.70	V	23.8	30.0	-6.2
147.5	5.72	14.68	2.50	H	22.9	30.0	-7.1
166.6	4.62	14.88	2.70	H	22.2	30.0	-7.8
182.1	4.80	15.20	2.80	V	22.8	30.0	-7.2
233.2	6.68	17.37	3.40	V	27.5	37.0	-9.6
248.4	9.22	17.63	3.40	H	30.3	37.0	-6.8
281.5	3.14	17.86	3.80	H	24.8	37.0	-12.2
347.7	4.48	16.22	4.00	H	24.7	37.0	-12.3
546.5	5.64	19.16	5.30	V	30.1	37.0	-6.9
877.2	2.72	23.98	6.90	H	33.6	37.0	-3.4



Measured by : Jin Pyo Hong / Engineer

Date : JULY 29, 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	2001.11.5
EMI Test Receiver	Rohde & Schwarz	ESVS30	2002.3.6
Rohde & Schwarz	EZM	N.A	Spectrum Monitor
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	2001.8.12
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