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KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE
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KEC

IKOMA TESTING LABORATORY
12128 TAKAYAMA-CHO
IKOMA-CITY NARA 630-0101 JAPAN

Corporate Juridical Person

TEST REPORT

Report No. A-009-00-C Date: 16 March 2000

This test report is to certify that the tested device properly complies with the requirements of:

FCC Rules and Regulations Part 22 Subpart H ; a Public Mobile Service.

ALL the tests necessary to show compliance to the requirements were performed and these results met the specifications of requirement. The results of this report should not be construed to imply compliance of equipment other than that which was tested. Unless the laboratory permission, this report should not be copied in part.

1. Applicant

Company Name : Shintom Co., Ltd.

Mailing Address : 1-19-20, Shin-Yokohama, Kohoku-ku, Yokohama, 222-0033 Japan

2. Identification of Tested Device

FCC ID	: BFYM3047
Device Name	: Handy Cellular Telephone
Trade Name	: AUDIOVOX
Model Number	: MVX605
Serial Number	: 17400000736
Date of Manufacture	: September 1998

3. Test Items and Procedure

(1) MEASUREMENT OF FIELD STRENGTH OF SPURIOUS RADIATION
(2) MEASUREMENT OF RF POWER OUTPUT(SUBSTITUTION METHOD)

Above all tests were performed under : FCC Part 2 Section 2.1046 and Section 2.1053

4. Date of Test

Receipt of Test Sample	: 23 February 2000
Test Completed on	: 10 March 2000

CERTIFIED BY :

Eizo Hariya
General Manager of Ikoma Testing Laboratory

Table of Contents

1. GENERAL INFORMATION

1.1 Product Description

The AUDIOVOX Model No. MVX605 (referred as EUT in this report) is a Handy Cellular Telephone.

(1) Transmitting Frequency Range	:	824.04 - 848.97 MHz
(2) Receiving Frequency Range	:	869.04 - 893.97 MHz
(3) Emission Designator	:	F3E
(4) Type of Circuit	:	Superheterodyne 1st IF : 83.16 MHz 2nd IF : 60 kHz
(5) Type of Antenna	:	Internal Antenna (50Ω, unbalanced)
(6) Rated Power Supply	:	DC 4.8 V NiMH Battery
(7) Contained Oscillator		
1) SYSTEM CLOCK	:	14.4 MHz
2) 2nd LOCAL OSC	:	83.1 MHz
3) RX VCO	:	952.2 - 977.13 MHz
4) TX VCO	:	824.04 - 848.97 MHz

1.2 Description for Equipment Authorization

(1) Rules Part(s) under which Equipment operated

FCC Rule Part 22, Subpart H ; a Public Mobile Service

(2) Kind of Equipment Authorization

☐ Type Acceptance ☒ Certification ☐ Verification

(3) Procedure of Application

☐ Original Equipment ☒ Modification

1.3 Test Facility

Name : KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC)
IKOMA TESTING LABORATORY
Open Test Site No.2

Address : 12128, Takayama-cho Ikoma-city, Nara, 630-0101 Japan

This test facility has been filed in FCC under the criteria in ANSI C63.4-1992.

2. TESTED SYSTEM

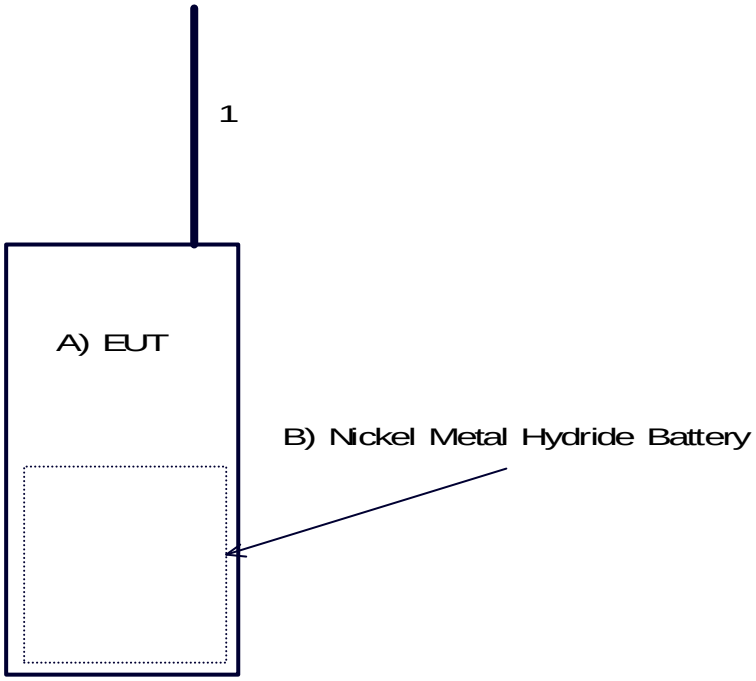
2.1 Test Mode

The EUT was placed in horizontally and vertically on the turn table.
The data of maximum emission was reported at each.

The compliance tests were performed under the following operation mode.

Carrier wave is continuously transmitted at Max power Level.

2.2 Block Diagram of EUT System



[Note]
See 2.3 List of EUT System and 2.4 List of Antenna

2.3 List of EUT System

No	Device Name	Model Number (Serial Number)	FCC ID (Trade Name)	Note	Remark
A	Handy Cellular Telephone	MVX605 17400000736	BFYM3047 (AUDIOVOX)		(1)
B	Ni MH Battery	BTE-605	N/A (AUDIOVOX)	Output DC4.8V	(2)

[Attention]
N/A : Not Applicable

[Remark]
(1) : EUT
(2) : Accessory of EUT

2.4 List of Antenna

No	Type	Length (m)	Note	Remark
1	Built-in Antenna (50Ω)	0.10	Permanently attached to EUT	

3. MEASUREMENT OF FIELD STRENGTH OF SPURIOUS RADIATION

3.1 Reference Rule and Specification

FCC Rule Part 22 Subpart H [§22.917] and Part 2 Subpart J [§2.1053]

3.2 Test Procedure

(1) Tune-up the transmitter.

(2) The transmitter and accessories are placed on the test table.

(3) For each spurious measurement the receiving antenna is used the dipole antenna or the broadband antenna or the horn antenna. These measurements are made from the lowest radio frequency generated in the EUT to the tenth harmonic of the carrier.

(4) For each spurious frequency, raise and lower the receiving antenna to obtain a maximum reading on the Spectrum Analyzer with the antenna at horizontal polarity. Then the turntable is rotated to further increase this maximum reading. Repeat this procedure of raising and lower the antenna and rotating the turntable until highest possible signal has been obtain. Record this maximum reading.

(5) Repeat Step (4) for each spurious frequency with the antennas polarized vertically.

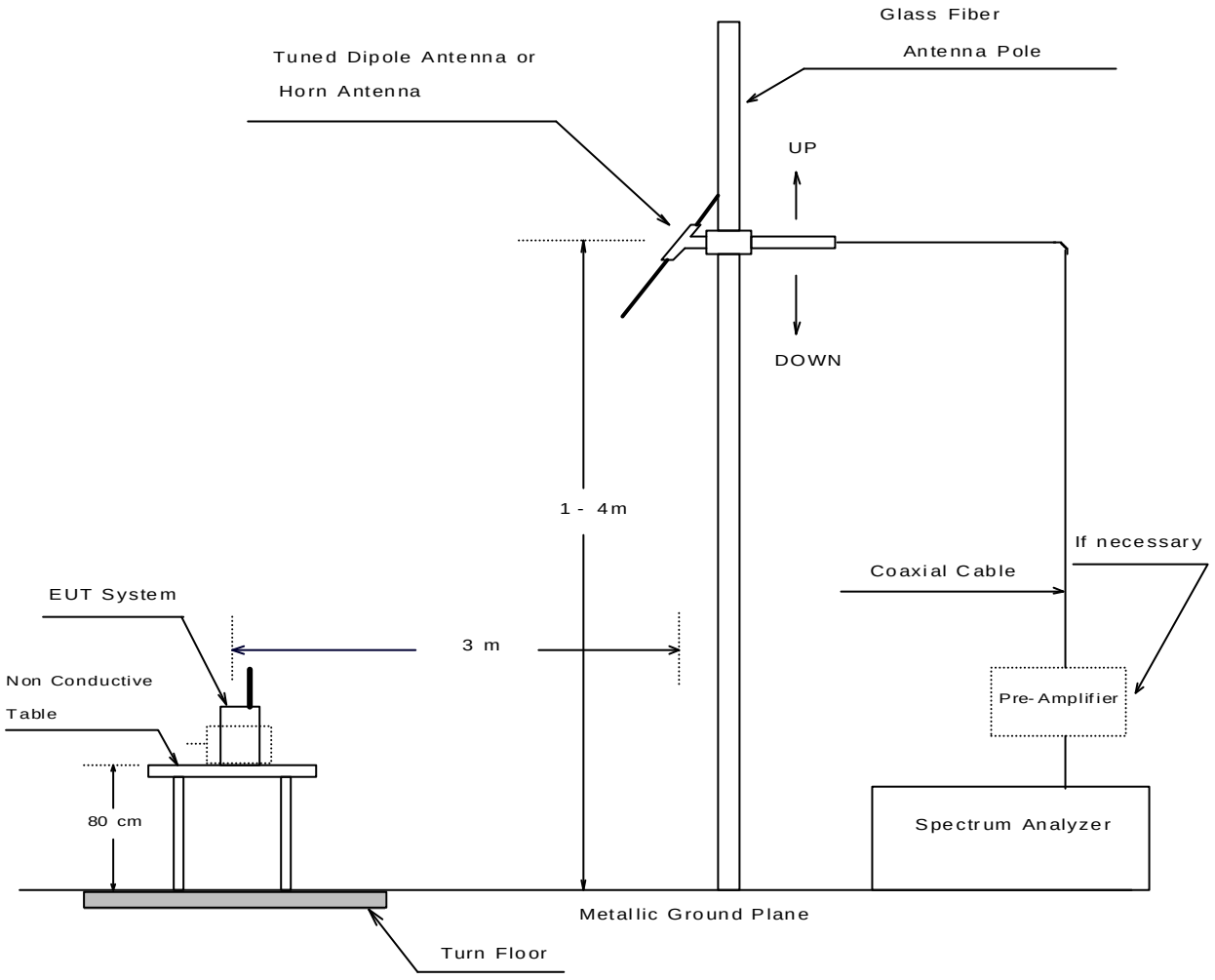
(6) The field strength of the spurious emission and the attenuation of the spurious in dB can be calculated from the following formula:

Field Strength of Spurious Emission [dBμV/m]	=	Meter Reading [dBμV]	+	Antenna Factor [dB/m]	+	Cable Loss [dB]	–	Pre-AMP Gain [dB]

Spurious Attenuation Ratio [dB]	=	Carrier Emission [dBμV/m]	–	Spurious Emission [dBμV/m]

3.3 Test Configuration

[Open Site]



3.4 Photographs of EUT System Configuration

Horizontally Placing

Vertically Placing

3.5 Test Results

(1) (991 ch.)

Emission Frequency [MHz]	Meter Reading [dBmV] Horiz.	Meter Reading [dBmV] Vert.	Antenna Factor [dB/m]	Pre-AMP GAIN [dB]	Maximum Field Strength [dBmV/m]	Attenuation Ratio From Carrier [dB]	Limit [dB]
Carrier Emission							
824.04	93.9	94.0	34.4	–	128.4	–	–
Spurious Emission							
1648.08	39.4	41.1	22.9	–	64.0	64.4	40.8
2472.12	38.0	40.2	23.2	–	63.4	65.0	40.8
3296.16	27.3	<25.0	24.2	–	51.5	76.9	40.8
4120.20	27.7	<25.0	25.1	–	52.8	75.6	40.8
4944.24	<25.0	<25.0	28.3	–	<53.3	>75.1	40.8
5768.28	17.1	15.1	32.0	–	49.1	79.3	40.8
6592.32	16.2	<15.0	30.8	–	47.0	81.4	40.8
7416.36	<15.0	<15.0	31.8	–	<46.8	>81.6	40.8
8240.40	<15.0	<15.0	34.3	–	<49.3	>79.1	40.8

[Note]
(1) The spectrum was scanned from 25MHz to the ten harmonic of the carrier, and all emissions not reported were very low.
(2) The cable loss is included in the antenna factor.
(3) Calculation of Limit

$$43 + 10\text{Log (Power)} = 43 + 10\text{Log (0.603)} = 40.8 \text{ dB}$$

[Environment]
Temperature : 18℃ Humidity : 52%

[Sample Calculation]
(Carrier Emission)
Frequency : 824.04 [MHz]
Meter Reading : 94.0 [dBμV] (at Vertical Polarization)
Antenna Factor : 34.4 [dB/m]

(Spurious Emission)
Frequency : 1648.08 [MHz]
Meter Reading : 41.1 [dBμV] (at Vertical Polarization)
Antenna Factor : 22.9 [dB/m]
Pre-AMP GAIN : - [dB]

Then, Field Strength is calculated as follows,

Field Strength(Carrier Emission) = 94.0 + 34.4 = 128.4 [dBμV/m]
Field Strength(Spurious Emission) = 41.1 + 22.9 = 64.0 [dBμV/m]

Then, Attenuation Ratio from Carrier is calculated as follows,

Attenuation Ratio from Carrier = 128.4 – 64.0 = 64.4 [dB]

[Summary of Test Result]
Minimum margin was 23.6 dB at 1648.08 MHz, at Vertical polarization.

Tested Date: 10 March 2000 Tester Signature

Yasunari Kawai

- Continued -

(2) (383 ch.)

Emission Frequency [MHz]	Meter Reading [dBmV] Horiz.	Vert.	Antenna Factor [dB/m]	Pre-AMP GAIN [dB]	Maximum Field Strength [dBmV/m]	Attenuation Ratio From Carrier [dB]	Limit [dB]
Carrier Emission							
836.49	93.5	95.3	34.5	–	129.8	–	–
Spurious Emission							
1672.98	40.0	39.1	24.9	–	64.9	64.9	40.8
2509.47	39.8	37.7	21.9	–	61.7	68.1	40.8
3345.96	28.3	27.8	24.1	–	52.4	77.4	40.8
4182.45	27.3	<25.0	26.7	–	54.0	75.8	40.8
5018.94	17.8	17.9	31.3	–	49.2	80.6	40.8
5855.43	16.3	<15.0	29.9	–	46.2	83.6	40.8
6691.92	<15.0	<15.0	30.9	–	<45.9	>83.9	40.8
7528.41	<15.0	<15.0	31.9	–	<46.9	>82.9	40.8
8364.90	<15.8	<15.0	34.4	–	50.2	79.6	40.8

[Note]

(1) The spectrum was scanned from 25MHz to the ten harmonic of the carrier, and all emissions not reported were very low.
(2) The cable loss is included in the antenna factor.
(3) Calculation of Limit
43 + 10Log (Power) = 43 + 10Log (0.603) = 40.8 dB

[Environment]

Temperature : 18℃ Humidity : 52%

[Sample Calculation]

(Carrier Emission)

Frequency : 836.49 [MHz]
Meter Reading : 95.3 [dBμV] (at Vertical Polarization)
Antenna Factor : 34.5 [dB/m]

(Spurious Emission)

Frequency : 1672.98 [MHz]
Meter Reading : 40.0 [dBμV] (at Horizontal Polarization)
Antenna Factor : 24.9 [dB/m]
Pre-AMP GAIN : - [dB]

Then, Field Strength is calculated as follows,

Field Strength(Carrier Emission) = 95.3 + 34.5 = 129.8 [dBμV/m]
Field Strength(Spurious Emission) = 40.0 + 24.9 = 64.9 [dBμV/m]

Then, Attenuation Ratio from Carrier is calculated as follows,

Attenuation Ratio from Carrier = 129.8 – 64.9 = 64.9 [dB]

[Summary of Test Result]

Minimum margin was 24.1 dB at 1672.98 MHz, at Horizontal polarization.

Tested Date: 10 March 2000 Tester Signature

Yasunari Kawai

- Continued -

(3) (799 ch.)

Emission Frequency [MHz]	Meter Reading [dBmV] Horiz.	Vert.	Antenna Factor [dB/m]	Pre-AMP GAIN [dB]	Maximum Field Strength [dBmV/m]	Attenuation Ratio From Carrier [dB]	Limit [dB]
Carrier Emission							
848.97	93.2	94.2	34.7	–	128.9	–	–
Spurious Emission							
1697.94	40.9	40.8	23.8	–	64.7	64.2	40.3
2546.91	37.6	37.2	23.9	–	61.5	67.4	40.3
3395.88	25.0	<25.0	25.1	–	50.1	78.8	40.3
4244.85	28.4	26.6	26.0	–	54.4	74.5	40.3
5093.82	<15.0	16.5	31.2	–	47.7	81.2	40.3
5942.79	20.2	16.8	30.1	–	50.3	78.6	40.3
6791.76	<15.0	<15.0	31.0	–	<46.0	>82.9	40.3
7640.73	<15.0	<15.0	32.1	–	<47.1	>81.8	40.3
8489.70	<15.0	<15.0	34.5	–	<49.5	>79.4	40.3

[Note]

(1) The spectrum was scanned from 25MHz to the ten harmonic of the carrier, and all emissions not reported were very low.
(2) The cable loss is included in the antenna factor.
(3) Calculation of Limit
43 + 10Log(Power) = 43 + 10Log(0.537) = 40.3 dB

[Environment]

Temperature : 18℃ Humidity : 52%

[Sample Calculation]

(Carrier Emission)

Frequency : 848.97 [MHz]
Meter Reading : 94.2 [dBμV] (at Vertical Polarization)
Antenna Factor : 34.7 [dB/m]

(Spurious Emission)

Frequency : 1697.94 [MHz]
Meter Reading : 40.9 [dBμV] (at Horizontal Polarization)
Antenna Factor : 23.8 [dB]
Pre-AMP GAIN : - [dB]

Then, Field Strength is calculated as follows,

Field Strength (Carrier Emission) = 94.2 + 34.7 = 128.9 [dBμV/m]
Field Strength (Spurious Emission) = 40.9 + 23.8 = 64.7 [dBμV/m]

Then, Attenuation Ratio from Carrier is calculated as follows,

Attenuation Ratio from Carrier = 128.9 – 64.7 = 64.2 [dB]

[Summary of Test Result]

Minimum margin was 23.9 dB at 1697.94 MHz, at horizontal polarization.

Tested Date: 10 March 2000 Tester Signature

Yasunari Kawai

4. MEASUREMENT OF RF POWER OUTPUT (Substitution Method)

4.1 Reference Rule and Specification

FCC Rule Part 22 Subpart H [§22.913] and Part 2 Subpart J [§2.1046]

4.2 Test Procedure

(1) Tune-up the transmitter.

(2) The transmitter and accessories are placed on the test table.

(3) The receiving antenna is adjusted to the correct length for the carrier frequency.

(4) Raise and lower the receiving antenna to obtain a maximum reading on the spectrum analyzer with the antenna at horizontal polarity. Then the turntable is rotated to further increase this maximum reading.
Repeat this procedure of raising and lower the antenna and rotating the turntable until the highest possible signal has been obtain.
Record this maximum reading.

(5) Repeat Step (4) with the antenna polarized vertically.

(6) Remove the transmitter and replace it with the tuned dipole antenna.
The center of this antenna is approximately at the same location as the center of the transmitter.

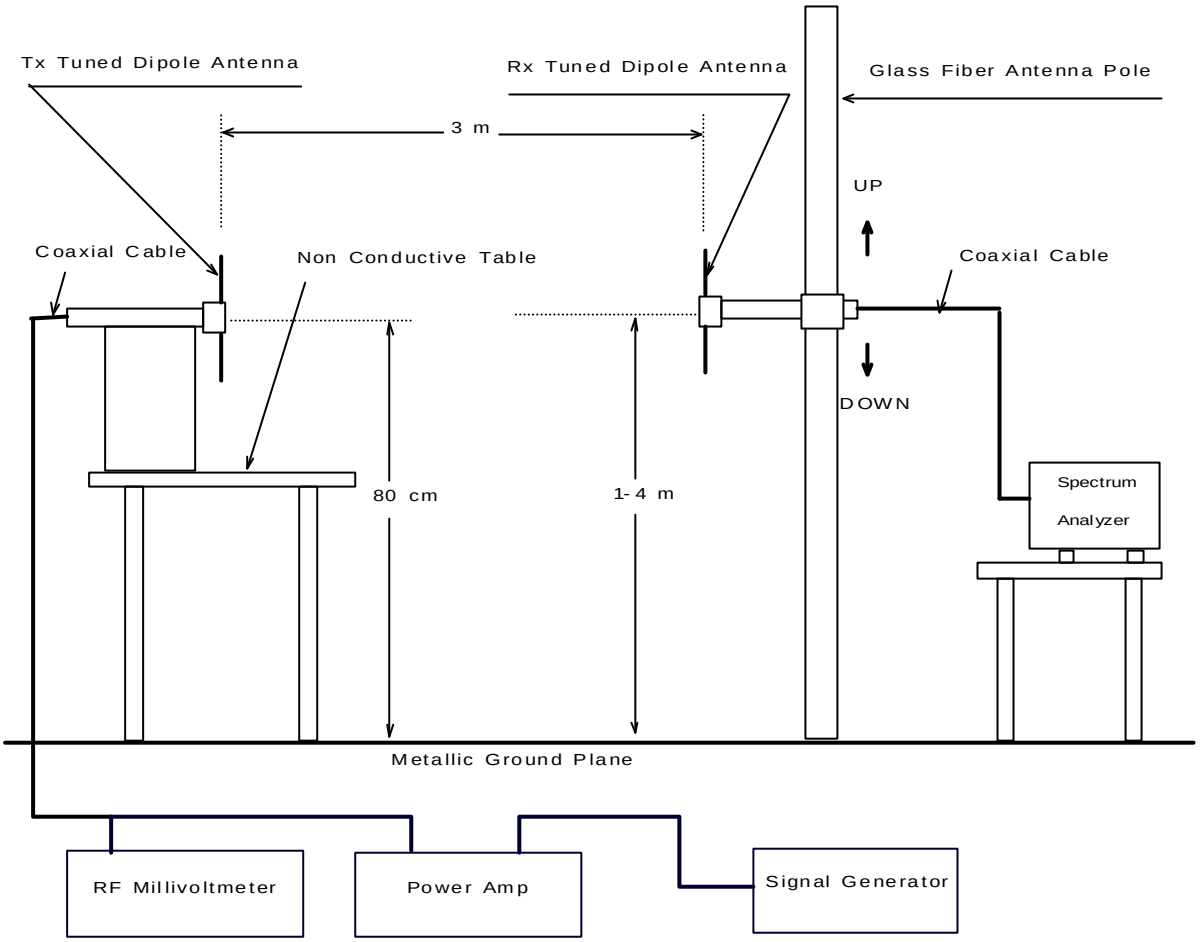
(7) Feed the tuned dipole antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable.
With the antennas at both ends horizontally polarized and with the signal generator tuned to the carrier frequency, raise and lower the receiver antenna to obtain a maximum reading at the spectrum analyzer.
Adjust the level of the signal generator output until the previous recorded maximum reading for this set of conditions its obtained.

(8) Repeat Step (7) with both antennas vertically polarized for the frequency.

(9) The RF Output Power can be calculated from following formula:

$$\text{RF Output Power [mW]} = 10^{(\text{SG Output Level [dBm]} - \text{Cable Loss [dB]}) / 10}$$

4.3 Test Configuration



4.4 Test Results

Carrier Frequency [MHz]	Meter Reading At 3m [dBμV]	SG Output Level [dBm]	Cable Loss [dB]	RF Output Power [mW]	Limit [W]
991 ch.					
824.04	91.7	29.9	2.1	603	7.0
383 ch.					
836.49	92.1	30.0	2.2	603	7.0
799 ch.					
848.97	90.8	29.5	2.2	537	7.0

[Environment]

Temperature : 18°C Humidity : 56%

[Sample Calculation]

Frequency : 824.04 [MHz]
SG Output Level : 29.9 [dBm] (at 991 ch.)
Cable Loss : 2.1 [dB]

Then, RF Power Output is calculated as follows,

RF Power Output = $10^{(29.9 - 2.1) / 10}$ = 603 [mW]

Tested Date : 10 March 2000 Tester Signature

Yasunari Kawai

5. LIST OF TEST INSTRUMENTS

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	If used, checked By "×".	Last Cal.	Next Cal.
Spectrum Analyzer	Advantest	TR4172	Frequency Range 50 Hz - 1.8 GHz	FS-44-2	☒	1999/5	2000/5
Pre-Selector	Advantest	TR14037	Frequency Range 10 kHz - 1.0 GHz	FS-44-3	☒	1999/5	2000/5
Tuned Dipole Antenna	Kyoritsu	KBA-611S	Frequency Range 500 MHz - 1 GHz	AN-137	☒	1999/3	2000/3
Tuned Dipole Antenna	Kyoritsu	KBA-611S	Frequency Range 500 MHz - 1 GHz	AN-115	☒	1999/3	2000/3
Signal Generator	Wiltron	6759A-10	Frequency Range 10 MHz - 26.5 GHz	SG-38	☒	1999/9	2000/9
Power Amp.	Amplifier Research	100W1000M 1	Frequency Range 80 MHz - 1 GHz	AM-55	☒	1999/6	2000/6
RF Millivolt-Meter	Rohde & Schwarz	URV5	Frequency Range 10 kHz - 2 GHz	VV-24	☒	1999/3	2000/3
Coaxial Cable	Suhner	SUCOFLEX 104	Length : 1m [SMA(p)-SMA(p)]	CL-42	☒	2000/2	2001/2
			Length : 10m [SMA(p)-SMA(p)]	CL-45	☒	2000/2	2001/2
				CL-46	☒	2000/2	2001/2
Spectrum Analyzer	Hewlett Packard	71210C	Frequency Range 100 kHz - 26 GHz	SA-34	☒	1999/10	2000/10
Horn Antenna	Raven	91888-2	Frequency Range 1 GHz - 2 GHz	AN-167	☒	1999/11	2000/11
		91889-2	Frequency Range 2 GHz - 5 GHz	AN-168	☒	1999/11	2001/11
	Scientific Atlanta	12-3.9	Frequency Range 3.95GHz - 5.85 GHz	AN-231	☒	1999/8	2000/8
		12-5.8	Frequency Range 5.85GHz - 8.2 GHz	AN-143	☒	1998/6	2000/6
		12-8.2	Frequency Range 8.2 GHz - 12.4 GHz	AN-055	☒	1999/8	2000/8
Terminator	Anritsu	MP752A	50 Ω	AT-44-3	☒	2000/2	2001/2