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KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

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KEC

Corporate Juridical Person

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

TEST REPORT

Report No.A-012-00-A Date: 18 April 2000

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

FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.

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 : MITSUBISHI ELECTRIC CORP.
Audio-Visual Systems Business Division Imaging Storage Products Department

Mailing Address : 1 Baba-Zusyo Nagaokakyo-City Kyoto 617-8550 Japan

2. Identification of Tested Device

Type of Device : Digital Device
Kind of Equipment Authorization : ☐: DoC ☒: Certification ☐: Verification
FCC ID : BGBR-9000RS
Device Name : INTERFACE BOARD
Trade Name : MITSUBISHI
Model Number : R-9000RS
Serial Number : P001 ☒: Prototype ☐: Pre-production ☐: Production
Date of Manufacture : March 2000

3. Test Items and Procedure

☒: AC Power Line Conducted Emission Measurement
☒: Radiated Emission Measurement

Above all tests were performed under: ANSI C63.4 – 1992
☒: without deviation, ☐: with deviation(details are found inside of this report)

4. Date of Test

Receipt of Test Sample : 21 March 2000
Test Completed on : 7 April 2000

Fumitoshi Nagaoka
Associate Director/ Ikoma Testing Laboratory

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0. NVLAP ACCREDITATION AND MEASUREMENT UNCERTAINTY

0.1. NVLAP Accreditation

KEC is accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code: 200207-0.

When a test report concerns with the NVLAP Accreditation test, the first page of the test report is sighed by NVLAP Approved Signatory together with the expression.

The report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

0.2. Measurement Uncertainty

The result of a measurement is only an approximation or estimate of the value of a specific quantity. And thus the measurand is complete only when a statement of uncertainty is given.
KEC quotes Measurement Uncertainty (U) of +/- 4.9 dB for Radiated Emissions and
of +/- 2.2 dB for Conducted Emissions.

1. CERTIFICATION OF THE COMPLIANCE

This test report is to certify that the tested device properly complies with the requirements of FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.

KEC evaluation criteria for compliance:
The Product complies, if
the measured results are below the specification limit by a margin more than or equal
1/2 U (2.5 dB) for Radiated Emissions and
U (2.2 dB) for Conducted Emissions.

2. GENERAL INFORMATION

2.1. Product Description

The MITSUBISHI Model No. R-9000RS (referred to as the EUT in this report) is a Optional RS-232C Interface Board for MITSUBISHI Time Lapse Video Cassette Recorders. By the use of the EUT, it is possible to control the Time Lapse Video Cassette Recorders from the computer.

Specification are as follows.

Communication Speed : 1200,2400,4800 or 9600bps

Provided terminals

(1) RS-232C IN connector of option board : For connecting computer.
(2) RS-232C OUT connector of option board : For connecting other Time Lapse VCR.

Contained Oscillators : 7.3728 MHz(RS-232C Micro computer clock)

Rated Power Supply : DC 5V (supplied from a Time Lapse VCR)

2.2. Description for Equipment Authorization

(1) Category	:	☐ Class A ☒ Class B
(2) Reference Rule and Specification	:	FCC Rule Part 15 ☒ Section 15.107 (a), 15.109 (a) and (c) ☐ Section 15.107 (b), 15.109 (b) and (c)
(3) Type of device	:	☒ Personal Computer & Peripherals ☐ Other Digital Device
(4) Kind of Equipment Authorization	:	☐ DoC ☒ Certification ☐ Verification
(5)Procedure of Application	:	☒ Original Equipment ☐ Modification
(6)Highest Frequency used in the Device	:	7.3728 MHz
(7)Upper Frequency of Radiated Emission Measurement Range	:	☒ 1000 MHz ☐ 2000 MHz ☐ 5000 MHz

2.3. Test Facility

All tests described in this report were performed by:

Name: KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC)
IKOMA TESTING LABORATORY

Open Area Test Site ☐ No.1 ☐ No.2 ☐ No.3 ☒ No.4
EMC M.C. Anechoic Chamber ☐ No.1
Shielded Room ☒ No.2 ☐ No.4 ☐ EMC M.C. Shielded Room

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

These test facilities have been filed with the FCC under the criteria of ANSI C63.4-1992. The Open Area Test Site No.4, EMC M.C. Anechoic Chamber No.1, Shielded Room No.4 and EMC M.C. Shielded Room have been accredited by the NVLAP (Lab. Code: 200207-0) based on ISO/IEC Guide 25.
Also the laboratory has been authorized by ITI (Interference Technology International, (UK), TUV Product Service (GER) and TUV Rheinland (GER) based on their criteria for testing laboratory (EN45001).

3. TESTED SYSTEM

3.1. Operation of EUT System

(1) Set the recording and playback speed mode of EUT to “2H”.
(2) Insert the VHS video cassette (120 minutes type) to the EUT.
(3) Execute the test program(*1) on floppy disk
(4) Execute the test program(*2) and “WIZARD.EXE”(*3).

Then following operations (a) – (k) were repeated and parallel.

(a) The EUT was operated forwarding the video cassette for 5 seconds.
(b) The EUT was operated stopping the video cassette.
(c) The EUT was operated recording both of a visual and aural on the video cassette by using the color CCD camera for 10 seconds, its condition were appeared on the color video monitor.
(d) The EUT was operated stopping the video cassette.
(e) The EUT was operated rewinding the video cassette for 5 seconds.
(f) The EUT was operated playback the video cassette for 8 seconds, ant its condition were appeared on the color video monitor.
(g) The EUT was operated stopping the video cassette.
(h) “H” pattern, one line 80 characters were printed by printer.
(i) FDD of personal computer was operated (Read/write/delete).
(j) HDD of personal computer was operated (Read/write/delete).
(k) “H” pattern (Font size:14, Font name:Arial) were appeared at full screen and scrolled on the LCD display of personal computer.

[Note]

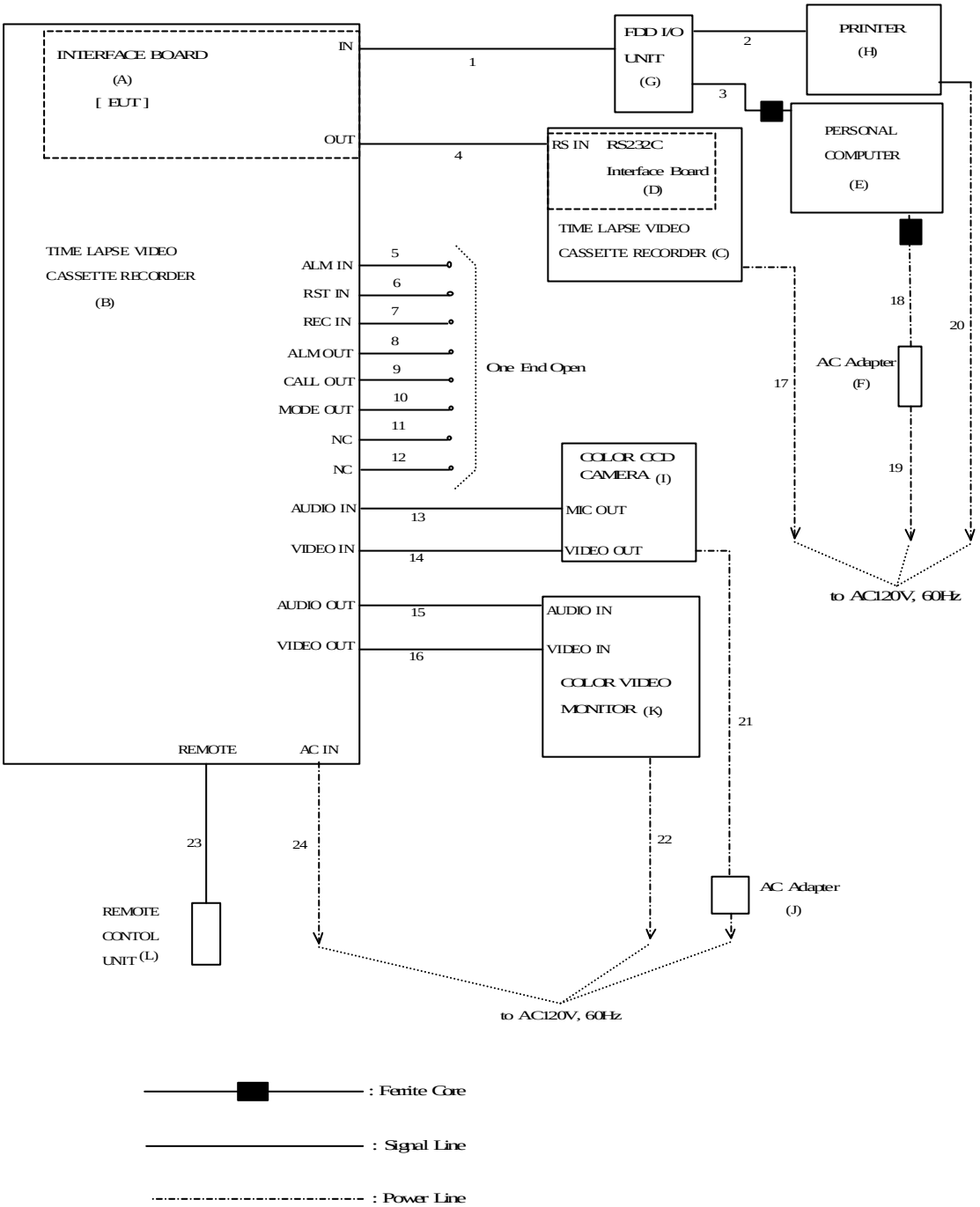
1) EUT operations were controlled by using the personal computer via the serial interface cable.
2) (*1) : this test program was prepared by the applicant, and it is the EUT control program.
3) (*2) : this test program was FDD, HDD and printer control program.
4) (*3) : this test program was displaying the “H” pattern on LCD monitor.
5) OS : Windows98

3.2. Characterization and Condition of EUT System

☒ : normal , ☐ : not normal (that is)

3.3 Block Diagram of EUT System

System-1



[Note]

See 3.5 List of EUT System and 3.6 List of Cables.

3.4 List of EUT System

No	Device Name (Interface)	Model Number (Serial Number)	FCC ID (Trade Name)	Note	Remark
A	INTERFACE BOARD (RS232C)	R-9000RS (P001)	BGBR-9000RS (MITSUBISHI)	Prototype Option of TIME LAPSE VIDEO CASSETTE RECORDER (B)	(1)
B	TIME LAPSE VIDEO CASSETTE RECORDER	HS-9424U (M012)	N/A (MITSUBISHI)		
C	TIME LAPSE VIDEO CASSETTE RECORDER	HS-7300U (P008)	N/A (MITSUBISHI)		
D	RS-232C Interface Board (RS232C)	R-7000RS (08-002)	BGBR-7000RS (MITSUBISHI)		
E	Personal Computer	PC-A150 (89019990)	DoC (SHARP)		
F	AC ADAPTER	EA-J01V (9980705254A)	N/A (SHARP)	Input : AC100-240V, 50/60 Hz Output : DC22V, 1.8A	(2)
G	FDD I/O UNIT	CE-FD02 (-)	N/A (SHARP)		(2)
H	PRINTER (Parallel)	ND-10 (290080300002)	B6D8MFND10 (Star)		
I	COLOR CCD CAMERA	YH-7B67 (000091)	N/A (SHARP)		
J	AC Adapter of COLOR CCD CAMERA (I)	RADP-A015SDEO (-)	N/A (SHARP)	Input:AC 120V, 60Hz Output:DC6V,500mA Accessory of COLOR CCD CAMERA (I)	
K	COLOR VIDEO MONITOR	VMC-7514 (H7205113)	N/A (SANYO)		
L	REMOTE CONTROL UNIT	R-5000 (-)	N/A (MITSUBISHI)	Option of TIME LAPSE VIDEO CASSETTE RECORDER (B)	

[Attention]

N/A: Not Applicable

[Remark]

(1): EUT

(2): Accessory device of Personal Computer (E)

3.5 List of Cables

No	Cable Name	Shielded (Y/N)	Length (m)	Note	Remark
1	Serial Interface Cable	Y	2.05	Both side D-sub 9pin type, Cross type	
2	Parallel interface Cable	Y	2.0		
3	FDD I/O UNIT (E) Cable	Y	0.2	with one ferrite core	(1)
4	Serial Interface Cable	Y	2.05		
5	Lead for ALM IN	N	1.0	one-end open	
6	Lead for RST IN	N	1.0	one-end open	
7	Lead for REC IN	N	1.0	one-end open	
8	Lead for ALM OUT	N	1.0	one-end open	
9	Lead for CALL OUT	N	1.0	one-end open	
10	Lead for MODE OUT	N	1.0	one-end open	
11	Lead for NC	N	1.0	one-end open	
12	Lead for NC	N	1.0	one-end open	
13	Audio cable	Y	1.8	RCA type	
14	Video cable	Y	1.8	RCA type	
15	Audio Cable	Y	1.4	RCA type	
16	Video Cable	Y	1.5	3C-1V type	
17	AC Power cord of TIME LAPSE VIDEO CASSETTE RECORDER (C)	Y	1.9	3-wires type, accessory cable of TIME LAPSE VIDEOCASSETTE RECORDER(C)	
18	DC Output cord of AC Adapter (F)	N	2.0	With one ferrite core	(1)
19	AC Input cord of AC Adapter(F)	N	2.0	2-wires type	(1)
20	AC Power cord of PRINTER(H)	N	1.85	3-wires type	(1)
21	DC Output cord of AC Adapter(J)	N	1.9		(1)
22	AC Power cord of COLOR VIDEO MONITOR (K)	N	1.9	3-wires type	(1)
23	REMOTE CONTROL UNIT(L) Cable	Y	3.0	Monaural mini plug type	(1)
24	AC Power Cord of TIME LAPSE VIDEO CASSETTE RECORDER(B)	Y	1.9	3-wires type	(2)

[Remark]

(1): Permanently attached to each device

(2): Accessory cable of TIME LAPSE VIDEO CASSETTE RECORDER (B)

4 AC POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1 Test Procedure

(1)	Configure the EUT System in accordance with ANSI C63.4-1992 section 7. ☒: without deviation, ☐: with deviation(details are found below) See also the block diagram and the photographs of EUT System configuration in this report.
(2)	Connect the EUT's AC power cord to one Line Impedance Stabilization Network (LISN).
(3)	Any other power cord of other equipment is connected to a LISN different from the LISN used for the EUT.
(4)	Warm up the EUT System.
(5)	Activate the EUT System and run the software prepared for the test, if necessary.
(6)	Connect the spectrum analyzer (*1) to the measuring port of the LISN for the EUT, using a calibrated coaxial cable.
(7)	To find out an EUT System condition, which produces the maximum emission, the configuration of EUT System, the position of the cables, and the operation mode, are changed under normal usage of the EUT.
(8)	The spectrums are scanned from 450 kHz to 30 MHz and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.
(9)	The test receiver (*2) is connected to the LISN for the EUT, and the six highest emissions minimum recorded above are measured.
	[Note]
(*1)	Spectrum Analyzer Set Up Conditions Frequency range : 450 kHz - 30 MHz Resolution bandwidth : 10 kHz Video bandwidth : 1 MHz Detector function : Peak mode
(*2)	Test Receiver Set Up Conditions Detector function : Quasi-Peak/ Average (if necessary) IF bandwidth : 10 kHz

4.2 Test Results

Measured Frequency (MHz)	LISN Factor (dB)	Meter Reading Va (dBuV)	Meter Reading Vb (dBuV)	Maximum RF Voltage (dBuV)	Limits (dBuV)	Margin for Limits (dB)
0.549	0.3	38.5	38.6	38.9	48.0	9.1
0.768	0.3	37.2	37.1	37.5	48.0	10.5
0.881	0.3	39.4	39.2	39.7	48.0	8.3
0.986	0.3	38.4	35.4	38.7	48.0	9.3
1.202	0.3	39.2	39.0	39.5	48.0	8.5
1.407	0.3	37.8	35.3	38.1	48.0	9.9
1.533	0.3	38.8	38.6	39.1	48.0	8.9

[Calculation method]

Maximum RF Voltage (dBμV)

= Meter Reading (at maximum level of Va or Vb) + LISN Factor (dB)

[Note]

(1) LISN Correction Factor includes the cable loss.

(2) The EUT is designed to use as built in a Time Lapse Video Cassette Recorder. Therefore, the conducted measurement of the EUT, is tested under the AC power lines of the Time Lapse Vide Cassette Recorder.

[Environment]

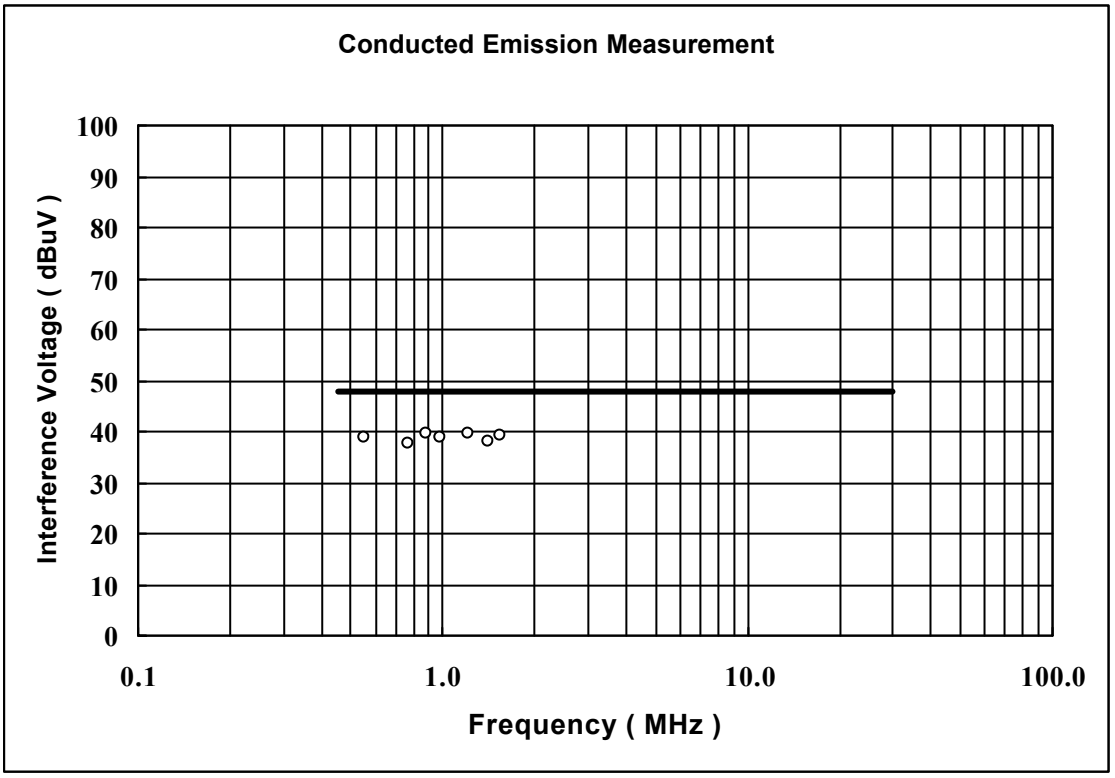
Temperature: 19°C Humidity: 54%

[Tested Date/ Tester]

7 April 2000 Signature

Ikuya Minematsu

Test Results in Graph



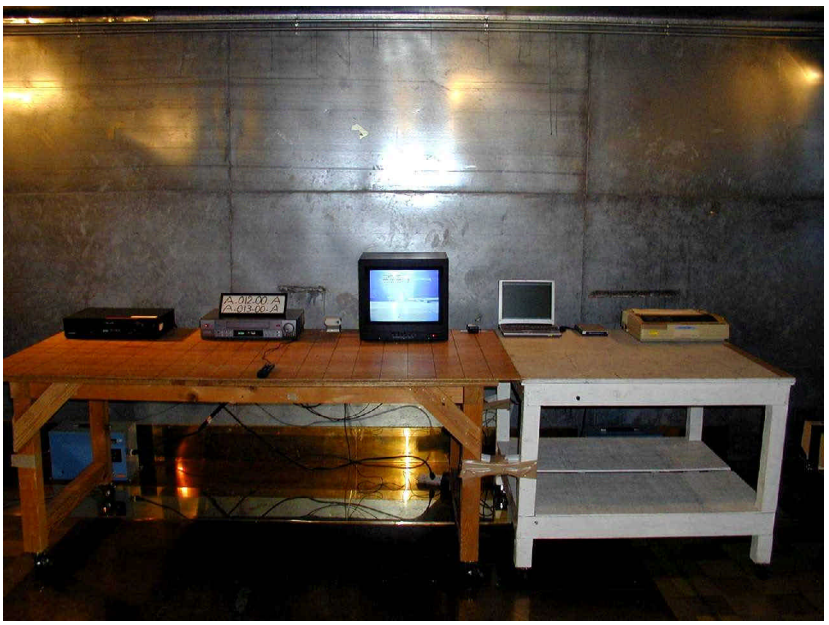
[Note]

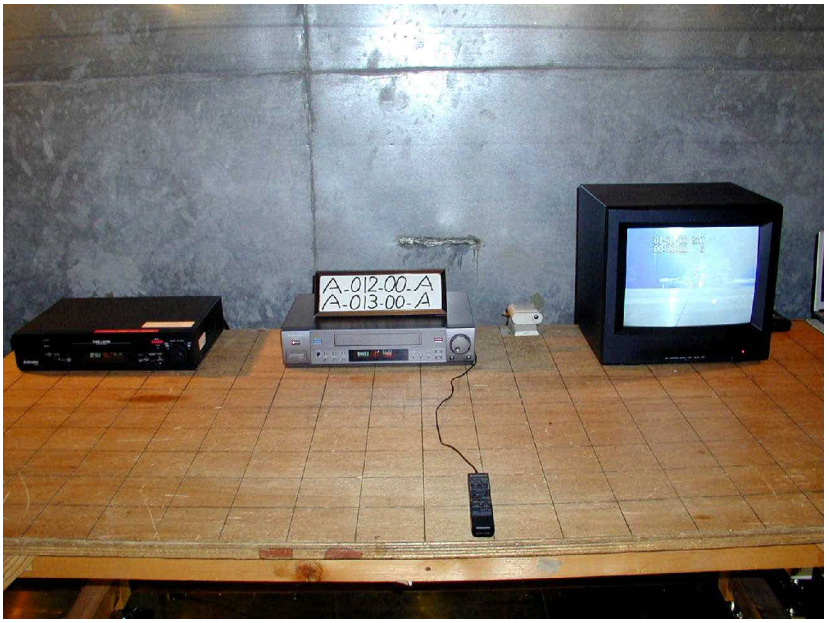
o : Maximum RF Voltage

▬ : Limit Line

4.3 Photographs of EUT System Configuration

FRONT VIEW





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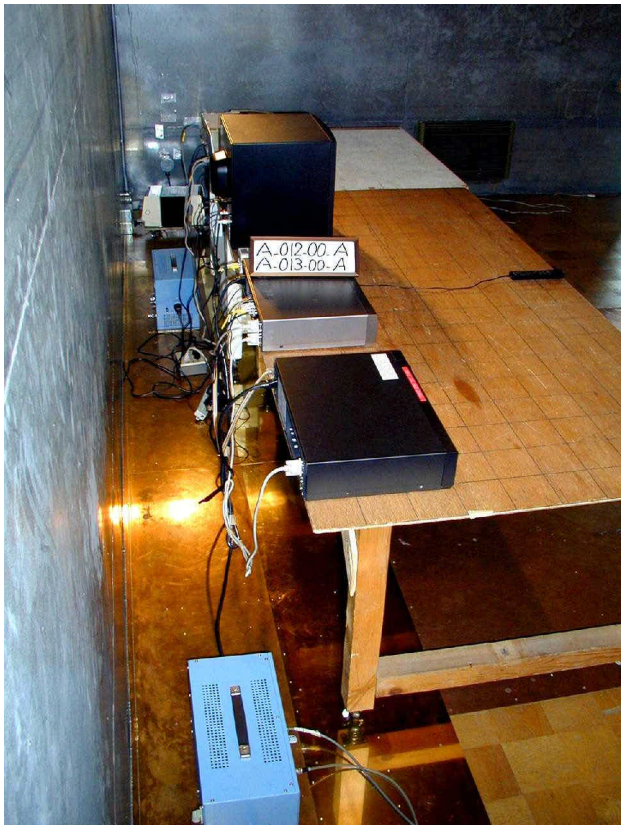
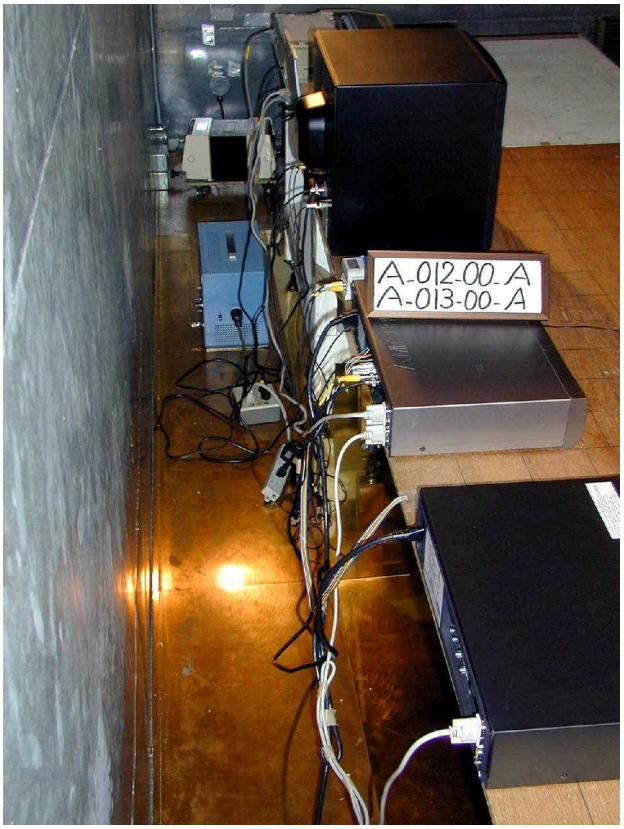
LEFT SIDE VIEW





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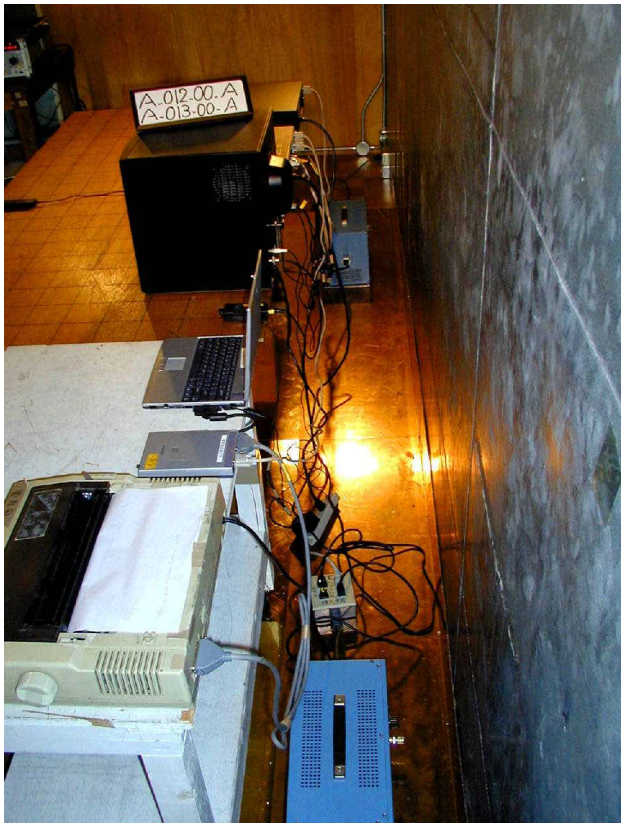
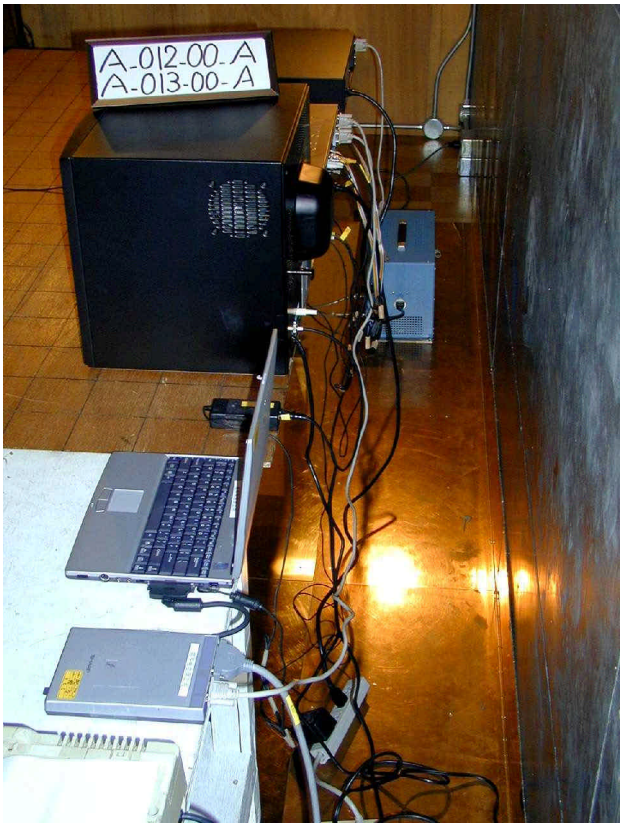
RIGHT SIDE VIEW





5 RADIATED EMISSION MEASUREMENT

5.1 Test Procedure

(1)	Configure the EUT System in accordance with ANSI C63.4-1992 section 8. ☒: without deviation, ☐: with deviation(details are found below) See also the block diagram and the photographs of EUT System configuration in this report.
(2)	If the EUT system is connected to a public power network, all power cords for the EUT System are connected the receptacle on the turntable.
(3)	Warm up the EUT System.
(4)	Activate the EUT System and run the prepared software for the test, if necessary.
(5)	To find out the emissions of the EUT System, preliminary radiated measurement are performed at a closer distance than that specified for final radiated measurement using the spectrum analyzer (*1) and the broad band antenna. In the frequency above 1 GHz, it is performed using the spectrum analyzer (*2) and the horn antenna.
(6)	To find out an EUT System condition, which produces the maximum emission, the configuration of EUT System, the position of the cables, and the operation mode, are changed under normal usage of the EUT.
(7)	The spectrums are scanned from 30 MHz to the upper frequency of measurement range, and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.
(8)	In final compliance test, the six highest emissions minimum, recorded above, are measured at the specified distance using the broad band antenna or the tuned dipole antenna and the test receiver (*3). In the frequency above 1 GHz, the measurements are performed by the horn antenna and ☐ the test receiver (*4). ☐ the spectrum analyzer(*2) with pre-amplifier.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency range	: 30 - 1000 MHz
Resolution bandwidth	: 100 kHz
Detector function	: Peak mode

(*2) Spectrum Analyzer Set Up Conditions

Frequency range	: 1 GHz - Upper frequency of measurement range
Resolution bandwidth	: 1 MHz
Video bandwidth	: 1 MHz
Attenuator	: 10 dB
Detector function	: Peak mode

(*3) Test Receiver Set Up Conditions

Detector function	: Quasi-Peak
IF bandwidth	: 120 kHz

(*4) Test Receiver Set Up Conditions

Detector function	: Average
IF bandwidth	: 1 MHz

5.2 Test Results

Measurement Distance ☒: 3m ☐: 10m

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limits	Margin for Limits
		Horizontal	Vertical			
(MHz)	(dB/m)	(dBuV)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
46.17	12.7	7.7	13.6	26.3	40.0	13.7
57.27	10.0	12.4	27.0	37.0	40.0	3.0
67.08	8.4	22.1	27.4	35.8	40.0	4.2
72.20	7.9	17.0	21.8	29.7	40.0	10.3
85.92	9.1	27.4	28.3	37.4	40.0	2.6
107.39	12.9	16.8	22.3	35.2	43.5	8.3
114.54	13.8	15.6	25.1	38.9	43.5	4.6
143.18	16.5	16.0	13.2	32.5	43.5	11.0
211.90	19.1	14.3	6.1	33.4	43.5	10.1
229.10	19.4	18.6	11.4	38.0	46.0	8.0
317.82	17.2	17.6	16.0	34.8	46.0	11.2
429.55	19.8	7.5	5.0	27.3	46.0	18.7
486.80	21.2	6.8	4.1	28.0	46.0	18.0

[Note]
(1) Antenna Factor includes the cable loss.
(2) * mark in Measured Frequency : Measured with the tuned dipole antenna.
no mark in Measured Frequency : Measured with the broadband antenna.

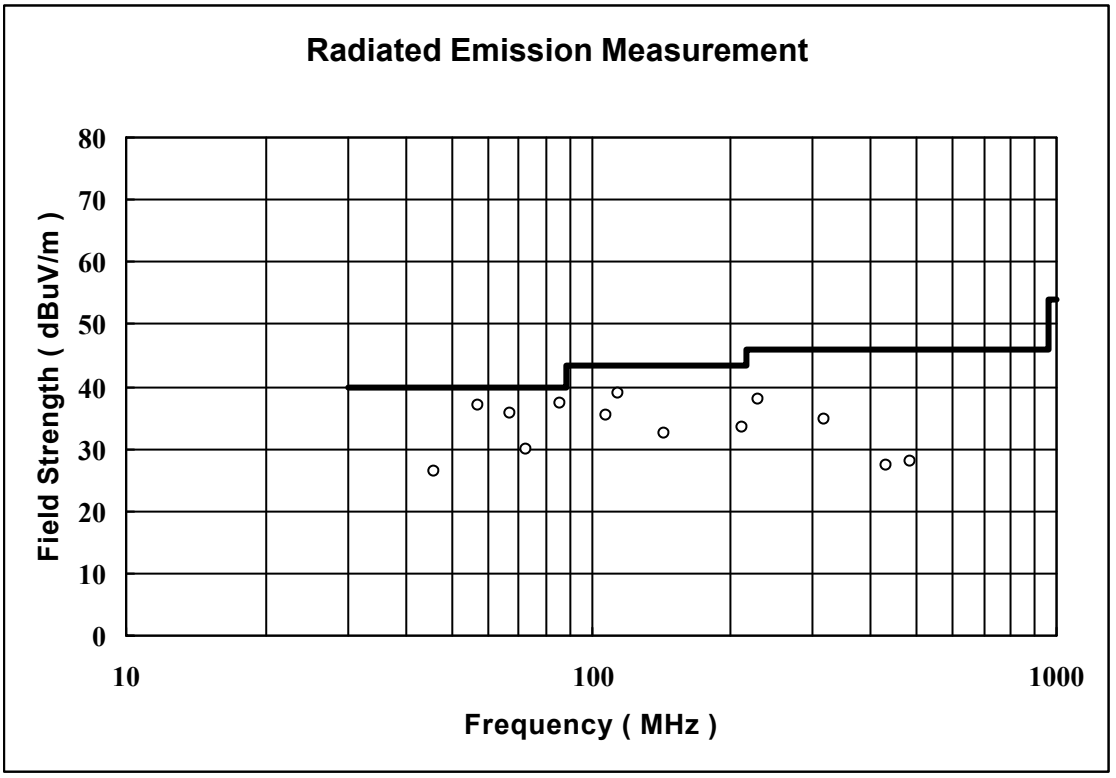
[Calculation method]
Maximum Field Strength (dBμV/m)
= Meter Reading (at maximum level of Horizontal or Vertical) (dBμV) + Antenna Factor (dB/m)

[Environment]
Temperature: 19°C Humidity: 54%

[Tested Date/ Tester]
31 March 2000 Signature

Ikuya Minematsu

Test Results in Graph



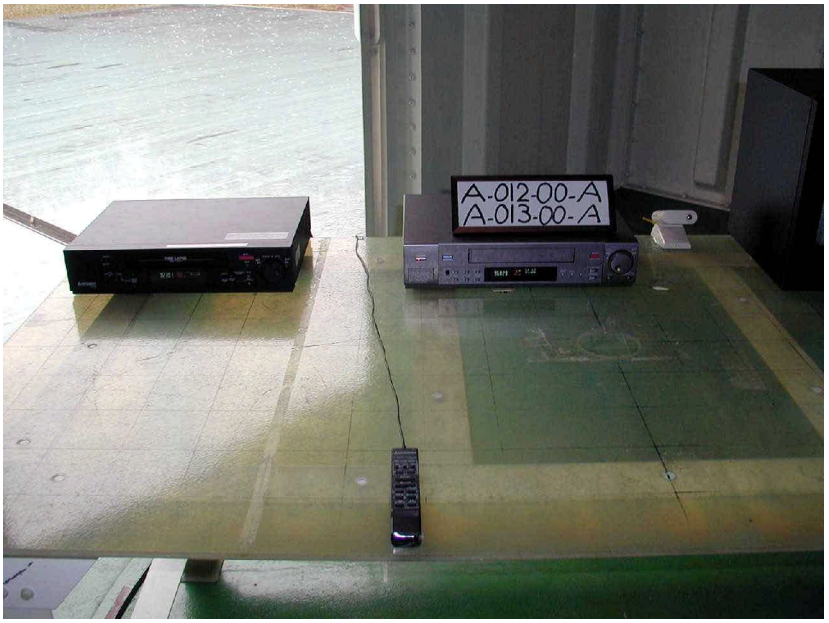
[Note]

o : Maximum Field Strength

▬ : Limit Line

5.3 Photographs of EUT System Configuration

FRONT VIEW



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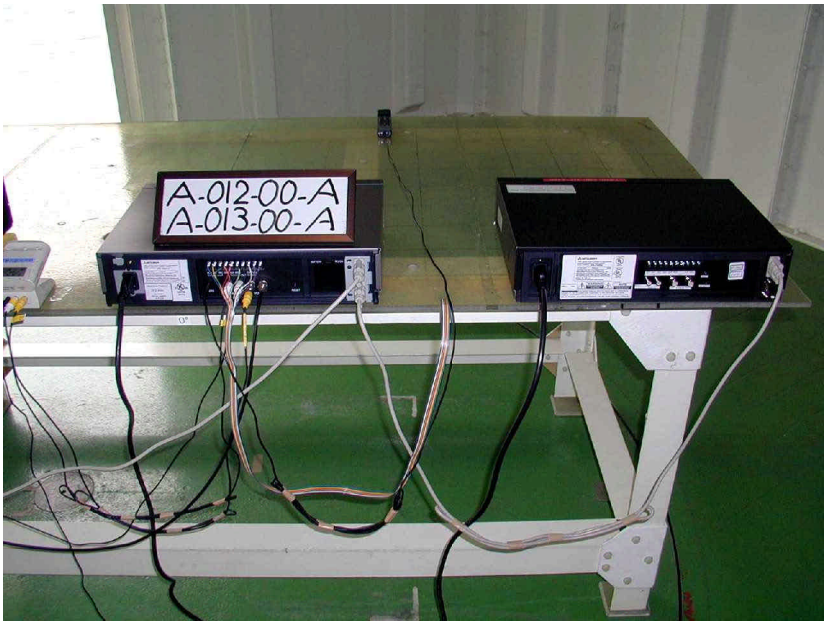
REAR VIEW



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REAR VIEW

6 USED EQUIPMENTS AND CALIBRATION STATUS

Equipment	Manufacturer	Model No.	Speecifications	KEC Control No.	Test Item (*)	Last Cal.	Next Cal.
Test Receiver	Rohde & Schwarz	ESH3	Frequency Range 9kHz-30MHz	FS-38	1	1999/5	2000/5
		ESVS10	Frequency Range 20MHz-1GHz	FS-82	2	2000/1	2001/1
Spectrum Analyzer	Advantest	R3261C	Frequency Range 9kHz-2.6GHz	SA-31	2	1999/8	2000/8
	Hewlett Packard	8568B	Frequency Range 100Hz-1.5 GHz	SA-16	1	1999/8	2000/8
Pre-Amprifier	Hewlett Packard	8449B	Frequency Range 1GHz-26.5GHz	AM-52	N/A	1999/4	2000/4
Biconical Antenna	Schwarzbeck	BBA9106	Frequency Range 30MHz-300MHz	AN-94	2	2000/2	2001/2
Log-Periodic Antenna	Schwarzbeck	UHALP9108A	Frequency Range 300MHz-1GHz	AN-217	2	2000/2	2001/2
Tuned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25MHz-500MHz	AN-135	N/A	2000/3	2001/3
		KBA-611S	Frequency Range 500MHz-1GHz	AN-137	N/A	2000/3	2001/3
Horn Antenna	Raven	91888-2	Frequency Range 1GHz-2GHz	AN-168	N/A	1999/11	2001/11
LISN for EUT	Kyoritsu	KNW-407	Frequency Range 150kHz-30MHz	FL-106	1	1999/4	2000/4
LISN For Peripherals	Kyoritsu	KNW-242	Frequency Range 150kHz-30MHz	FL-110	1	1999/4	2000/4
Terminator for LISN	Tamagawa	CT-005	Frequency Range 150kHz-30MHz	FL-56-1	N/A	1999/4	2000/4
				FL-77-1	N/A	1999/4	2000/4
				FL-110-1	1	1999/4	2000/4
RF Switch	Rohde & Schwarz	PSU-S	Frequency Range 30MHz-1GHz	MM-123	N/A	2000/2	2001/2

[Note]
Test Item (*): 1: Conducted Emission Measurement
2: Radiated Emission Measurement (30 MHz – 1 GHz)
3: Radiated Emission Measurement (1 GHz <)
N/A: Not Applicable

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurements made by KEC are traceable to national standards of measurement or equivalent abroad.