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KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE

6-8-7 NISHITENMA

KITA-KU OSAKA 530-0047 JAPAN



Corporate Juridical Person

IKOMA TESTING LABORATORY

12128 TAKAYAMA-CHO

IKOMA-CITY NARA 630-0101 JAPAN

TEST REPORT**Report No.A-036-00-A**

Date: 13 November 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.
Kyoto Works 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 : BGB232C-1P
Device Name : Time lapse Video Cassette Recorder
Trade Name : MITSUBISHI
Model Number : HS-S9600U
Serial Number : 0000006 ☒: Prototype ☐: Pre-production ☐: Production
Date of Manufacture : October 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 : 30 October 2000
Test Completed on : 6 November 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 signed 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. HS-S9600U (referred to as the EUT in this report) is a Time lapse Video Cassette Recorders. It is possible to control the EUT from the computer.

(1) Technical Specification

Video tape	: S-VHS / VHS
RS-232C bound Rate	: 1200 – 9600 bps

(2) Used Oscillating Frequencies

0.032768 MHz	: Microcomputer clock
0.07 ~ 0.130 MHz	: Switching Frequency
0.072 MHz	: Audio oscillator
3.579545 MHz	: CG, Y/C/A clock
7.3728 MHz	: Microcomputer clock (RS-232C-REMO circuit)
12.0 MHz	: Microcomputer clock

(3) Equipped Interface terminals

RS-232C terminal	: D-sub 15pin type
VIDEO IN terminal	: BNC 75Ω type
S-VIDEO IN terminal	: s-video input terminal
VIDEO OUT terminal	: BNC 75Ω type
S-VIDEO OUT terminal	: s-video output terminal
VIDEO OUT (FRONT) terminal	: RCA type, 75Ω
AUDIO IN terminal	: RCA type
AUDIO OUT terminal	: RCA type
MIC terminal	: Monaural mini jack type
REMOTE terminal	: Monaural mini jack type
ALM IN terminal	: Input terminal for alarm recording.
RST IN terminal	: Input terminal to stop alarm recording when the "ALARM REC DURATION" of MAIN MENU is set to "MAN1".
REC IN terminal	: Input terminal to start/stop recording.
GND(GROUND) terminal	: When a lead connected to other terminals requires a ground, connect the ground lead here.
ALM (ALARM) OUT terminal	: Output terminal to relay alarm recording to an outside alarm
MODE OUT terminal	: Output terminal to relay the VCR mode selected by the "MODE OUT" of MAIN MENU.
CLK(CLOCK)OUT terminal	: Output terminal for the camera switching time.
CALL OUT terminal	: Output terminal to relay tape finishing and/or internal abnormality during recording.

(4) Rated Power Supply : AC 100 ~ 230 V, 50/60 Hz

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 : 12.0 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 MC. Anechoic Chamber No.1, Shielded Room No.4 and EMC MC. 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) RS-232C the EUT serial port setting is set as following by menu display

RATE	: 9600bps
BIT LENGTH	: 8 BIT
STOP BIT	: 1 BIT
PARITY BIT	: NONE
- (3) Insert the S-VHS video cassette (120 minutes type) to the EUT.
- (4) Execute the test program(*1) on floppy disk
- (5) Execute “WIZARD.EXE”(*2).

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, and 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.

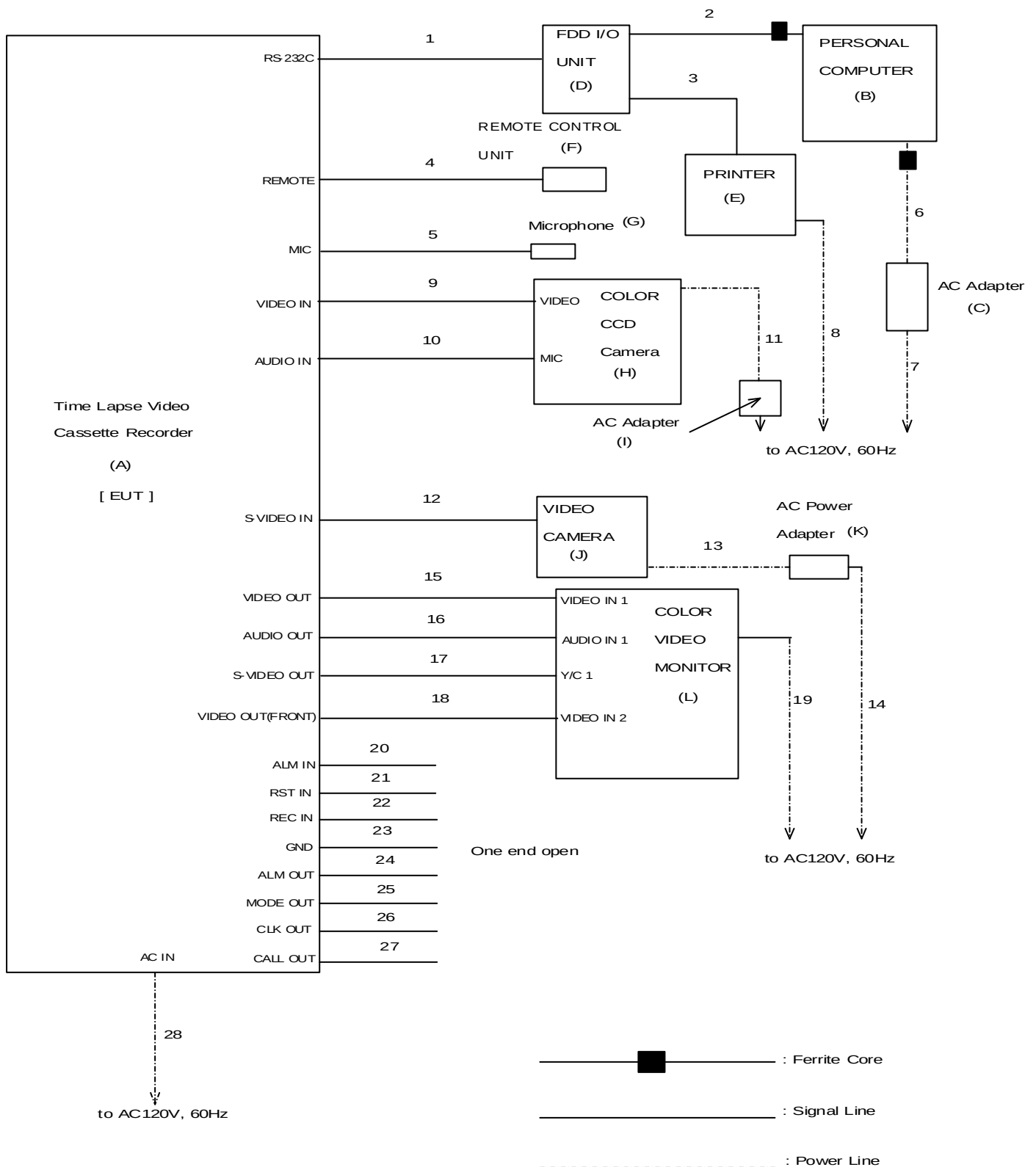
[Note]

- 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 displaying the “H” pattern on LCD monitor.
- 4) OS : Windows98

3.2. Characterization and Condition of EUT System

☒ : normal , ☐ : not normal (that is)

3.3 Block Diagram of EUT System



[Note]

See 3.4 List of EUT System and 3.5 List of Cables.

3.4 List of EUT System

No	Device Name (Interface)	Model Number (Serial Number)	FCC ID (Trade Name)	Note	Remark
A	Time lapse Video Cassette Recorder (Serial)	HS-S9600U (0000006)	N/A (MITSUBISHI)		(1)
B	PERSONAL COMPUTER	PC-A150 (89019990)	DoC (SHARP)		
C	AC Adapter	EA-J01V (C980705264A)	N/A (SHARP)	Input : AC100-240V, 50/60 Hz Output : DC22V, 1.8A	(2)
D	FDD I/O UNIT	CE-FD02 (-)	N/A (SHARP)		(2)
E	PRINTER (Parallel)	ND-10 (290080300002)	B6D8MFND10 (Star)		
F	REMOTE CONTROL UNIT	R-9100 (-)	N/A (MITSUBISHI)		
G	Microphone	HDM5241-010040 (-)	N/A (HOSHIDEN)		
H	COLOR CCD CAMERA	YH-7B67 (000091)	N/A (SHARP)		
I	AC Adapter	RADP-A015SDEO (-)	N/A (SHARP)	Input:AC 120V, 60Hz Output:DC6V,500mA Accessory of COLOR CCD CAMERA (H)	
J	VIDEO CAMERA	HS-CX7(U) (M024)	N/A (MITSUBISHI)		
K	AC Power Adapter	DA-U1 (F9100003M)	N/A (MITSUBISHI)	Accessory of VIDEO CAMERA (J)	
L	COLOR VIDEO MONITOR	PVM-14N6J (6000652)	N/A (SONY)		

[Attention]

N/A: Not Applicable

[Remark]

(1): EUT

(2): Accessory of PERSONAL COMPUTER (B)

3.5 List of Cables

No	Cable Name	Shielded (Y/N)	Length (m)	Note	Remark
1	RS-232C Interface Cable	Y	2.0	Both side D-sub 15pin type	
2	FDD I/O UNIT Cable	Y	0.2	with one ferrite core	(1)
3	Parallel Interface Cable	Y	2.0		
4	REMOTE CONTROL UNIT Cable	Y	3.0	Monaural mini jack type	(1)
5	Microphone Cable	N	3.0		(1)
6	DC Output Cord of AC Adapter (C)	N	1.7	with one ferrite core	(1)
7	AC Input Cord of AC Adapter (C)	N	2.0	2-wires type	(1)
8	AC Power Cord of PRINTER	N	1.85	3-wires type	
9	Video Signal Cable	Y	1.7	RCA type, use conversion Connector (BNC RCA)	(2)
10	Audio Signal Cable	Y	1.7	RCA type	(2)
11	DC Output Cord of AC Adapter (I)	N	1.9		(1)
12	S-Video Cable	Y	1.5		
13	DC Output Cord of AC Power Adapter	N	2.0		(1)
14	AC Input Cord of AC Power Adapter	N	1.7		(1)
15	Video Signal Cable	Y	5.0	3C-2V type	
16	Audio Signal Cable	Y	2.5	RCA type	
17	S-Video Cable	Y	10.0		
18	Video Signal Cable	Y	5.0		
19	AC Power Cord of COLOR VIDEO MONITOR	N	2.4	2-wires type	
20	Lead for ALM IN terminal	N	2.0		
21	Lead for RST IN terminal	N	2.0		
22	Lead for REC IN terminal	N	2.0		
23	Lead for GND terminal	N	2.0		
24	Lead for ALM OUT terminal	N	2.0		
25	Lead for MODE OUT terminal	N	2.0		
26	Lead for CLK OUT terminal	N	2.0		
27	Lead for CALL OUT terminal	N	2.0		
28	AC Power Cord of EUT	Y	2.0	3-wires type	(3)

[Remark]

(1): Permanently attached to each peripheral device

(2): Accessory of COLOR CCD Camera (H).

(3): Accessory of EUT

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		Maximum RF Voltage (dBuV)	Limits (dBuV)	Margin for Limits (dB)
		Va (dBuV)	Vb (dBuV)			
0.647	0.4	39.4	39.3	39.8	48.0	8.2
0.936	0.4	39.9	39.7	40.3	48.0	7.7
1.013	0.4	40.0	39.8	40.4	48.0	7.6
1.212	0.4	40.1	40.0	40.5	48.0	7.5
1.479	0.4	40.1	39.9	40.5	48.0	7.5
1.618	0.4	40.3	40.0	40.7	48.0	7.3

[Note]

LISN Correction Factor includes the cable loss.

[Calculation method]

Maximum RF Voltage (dBuV)

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

[Environment]

Temperature: 26°C

Humidity: 70%

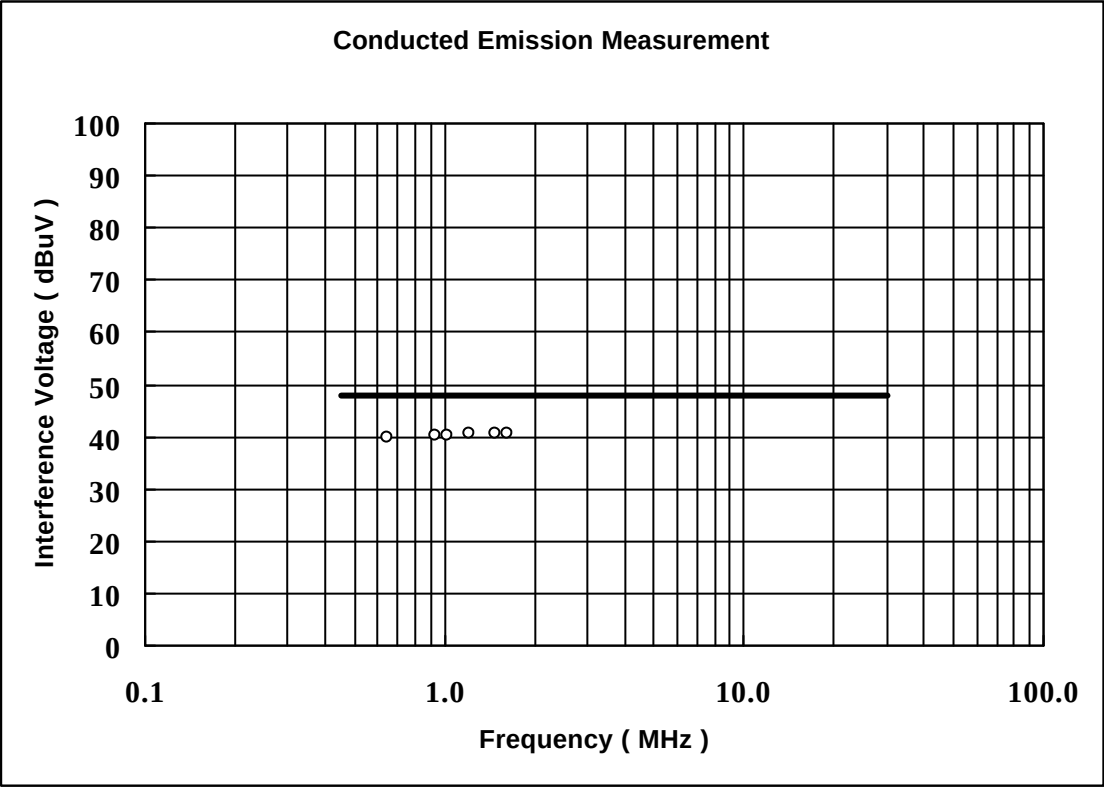
[Tested Date/ Tester]

6 November 2000

Signature


 Ikuya Minematsu

Test Results in Graph

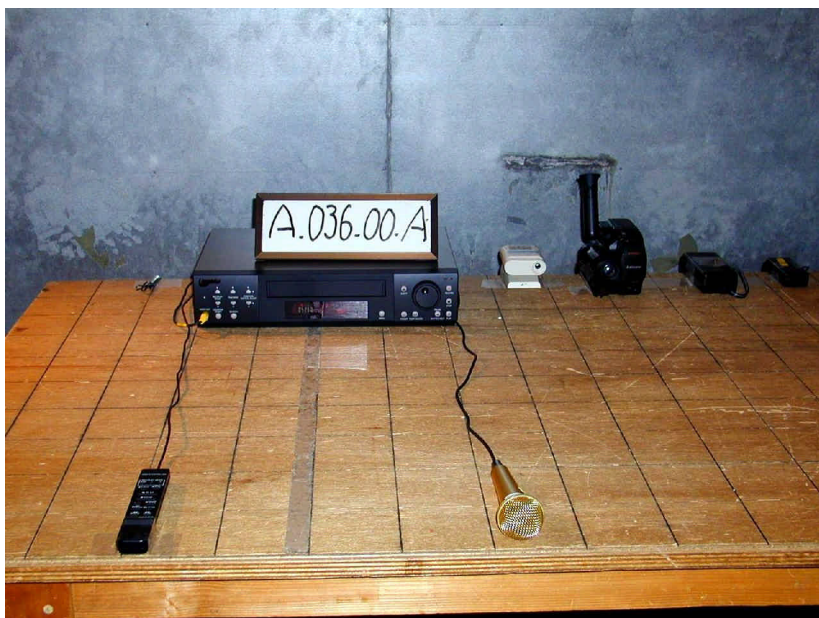
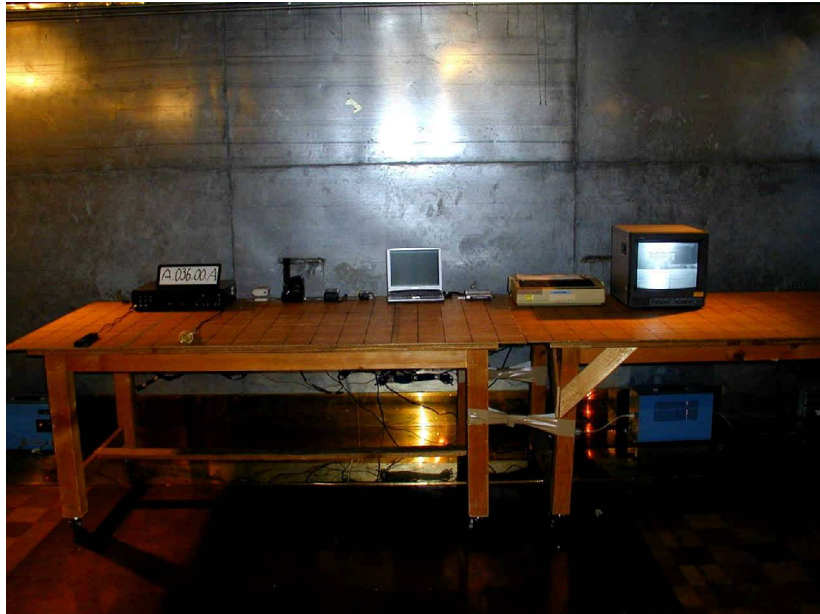


[Note]

- : Maximum RF Voltage
- : Limit Line

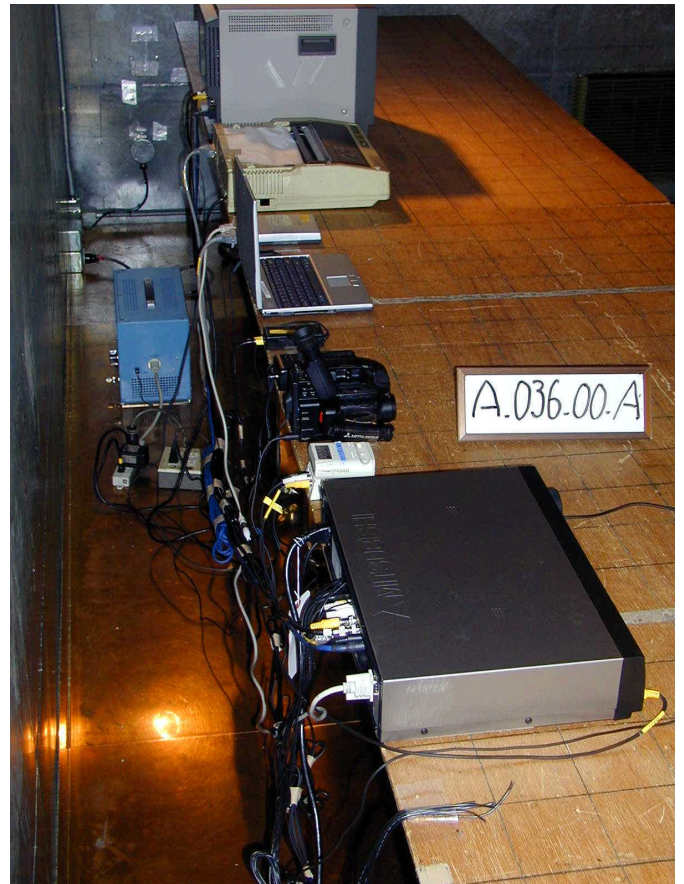
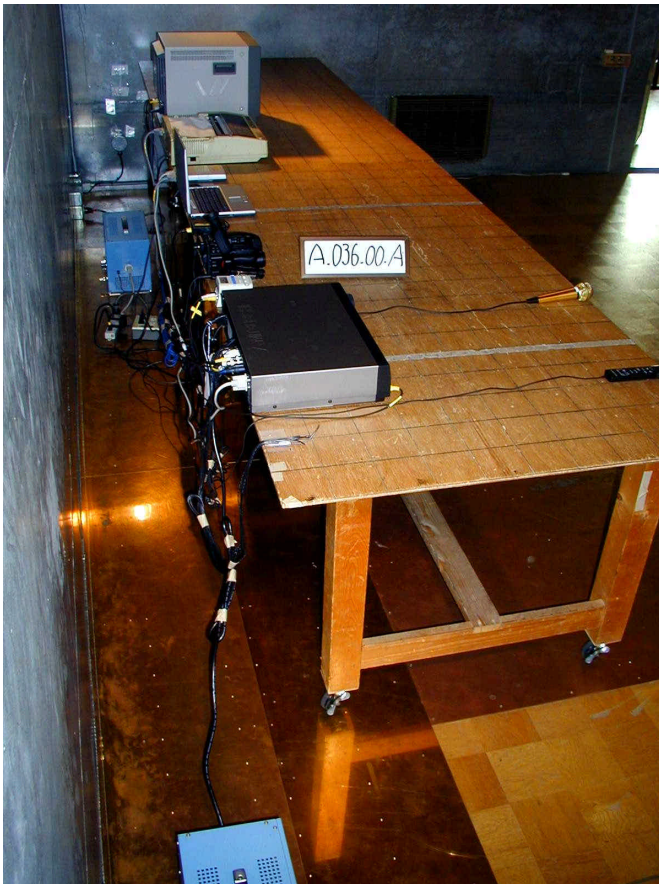
4.3 Photographs of EUT System Configuration

FRONT VIEW



- Continued -

LEFT SIDE VIEW



- Continued -

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 <table> <tr> <td>Frequency range</td> <td>: 30 - 1000 MHz</td> </tr> <tr> <td>Resolution bandwidth</td> <td>: 100 kHz</td> </tr> <tr> <td>Detector function</td> <td>: Peak mode</td> </tr> </table>	Frequency range	: 30 - 1000 MHz	Resolution bandwidth	: 100 kHz	Detector function	: Peak mode				
Frequency range	: 30 - 1000 MHz										
Resolution bandwidth	: 100 kHz										
Detector function	: Peak mode										
(*2)	Spectrum Analyzer Set Up Conditions <table> <tr> <td>Frequency range</td> <td>: 1 GHz - Upper frequency of measurement range</td> </tr> <tr> <td>Resolution bandwidth</td> <td>: 1 MHz</td> </tr> <tr> <td>Video bandwidth</td> <td>: 1 MHz</td> </tr> <tr> <td>Attenuator</td> <td>: 10 dB</td> </tr> <tr> <td>Detector function</td> <td>: Peak mode</td> </tr> </table>	Frequency range	: 1 GHz - Upper frequency of measurement range	Resolution bandwidth	: 1 MHz	Video bandwidth	: 1 MHz	Attenuator	: 10 dB	Detector function	: Peak mode
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 <table> <tr> <td>Detector function</td> <td>: Quasi-Peak</td> </tr> <tr> <td>IF bandwidth</td> <td>: 120 kHz</td> </tr> </table>	Detector function	: Quasi-Peak	IF bandwidth	: 120 kHz						
Detector function	: Quasi-Peak										
IF bandwidth	: 120 kHz										
(*4)	Test Receiver Set Up Conditions <table> <tr> <td>Detector function</td> <td>: Average</td> </tr> <tr> <td>IF bandwidth</td> <td>: 1 MHz</td> </tr> </table>	Detector function	: Average	IF bandwidth	: 1 MHz						
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)
35.03	17.7	1.4	11.0	28.7	40.0	11.3
47.73	13.1	4.3	16.6	29.7	40.0	10.3
60.01	9.0	14.1	23.1	32.1	40.0	7.9
71.98	7.9	25.8	24.2	33.7	40.0	6.3
108.34	13.4	8.6	13.6	27.0	43.5	16.5
114.45	14.2	10.1	14.9	29.1	43.5	14.4
152.52	16.9	14.3	11.6	31.2	43.5	12.3
178.08	18.1	6.8	10.4	28.5	43.5	15.0
229.09	19.4	15.3	14.7	34.7	46.0	11.3
317.84	17.7	14.2	13.8	31.9	46.0	14.1
355.97	18.5	19.8	11.0	38.3	46.0	7.7
495.83	21.5	12.0	7.0	33.5	46.0	12.5
546.68	22.4	9.5	4.8	31.9	46.0	14.1
889.92	27.5	7.0	10.3	37.8	46.0	8.2

[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 (dBuV/m)

= Meter Reading (at maximum level of Horizontal or Vertical) (dBuV) + Antenna Factor (dB/m)

[Environment]

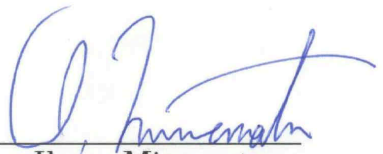
Temperature: 24°C

Humidity: 77%

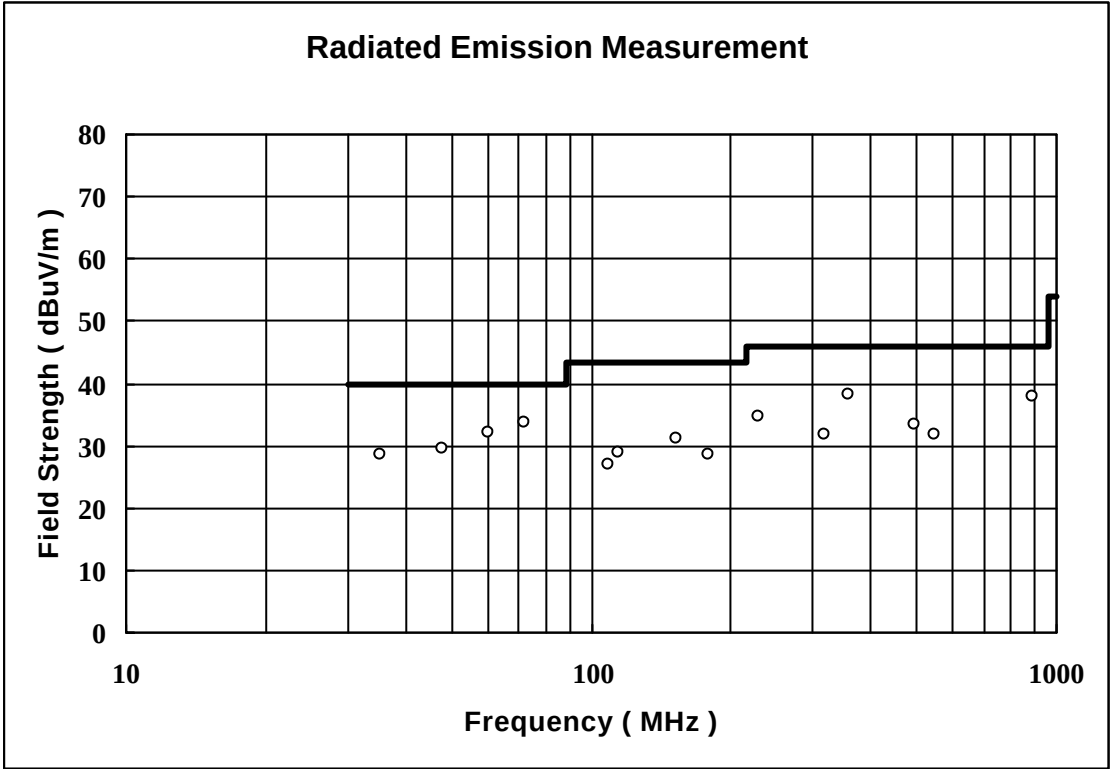
[Tested Date/ Tester]

6 November 2000

Signature


 Ikuya Minematsu

Test Results in Graph



[Note]

- : Maximum Field Strength
- : Limit Line

5.3 Photographs of EUT System Configuration

FRONT VIEW

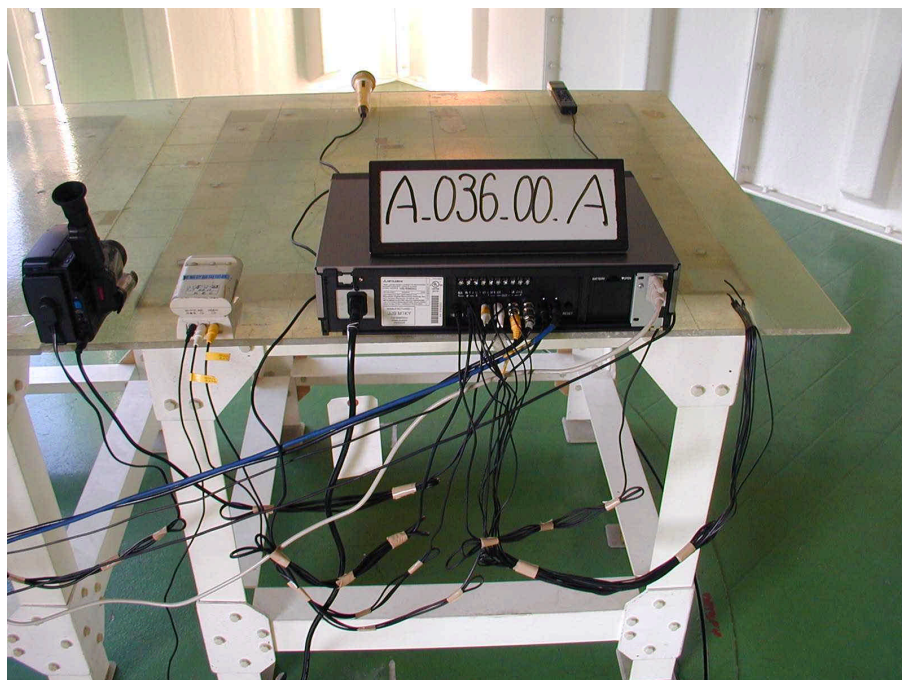


REAR VIEW



- Continued -

REAR VIEW



6 USED EQUIPMENTS AND CALIBRATION STATUS

Equipment	Manufacturer	Model No.	Specifications	KEC Control No.	Test Item (*)	Last Cal.	Next Cal.
Test Receiver	Rohde & Schwarz	ESHS10	Frequency Range 9kHz-30MHz	FS-83	1	2000/3	2001/3
		ESVS10	Frequency Range 20MHz-1GHz	FS-82	2	2000/1	2001/1
Spectrum Analyzer	Advantest	R3261C	Frequency Range 9kHz-2.6GHz	SA-31	2	2000/8	2001/8
	Hewlett Packard	8568B	Frequency Range 100Hz-1.5 GHz	SA-16	1	2000/8	2001/8
Pre-Amprifier	Hewlett Packard	8449B	Frequency Range 1GHz-26.5GHz	AM-52	N/A	2000/2	2001/2
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	2000/4	2001/4
LISN For Peripherals	Kyoritsu	KNW-242	Frequency Range 150kHz-30MHz	FL-110	1	2000/4	2001/4
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.