Designated by Ministry of International Trade and Industry

KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE
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KEC

IKOMA
TESTING LABORATORY
10630, TAKAYAMA-CHO
IKOMA-CITY, NARA, 630-01 JAPAN

Corporate Juridical Person

ENGINEERING TEST REPORT

REPORT NO. A-023-98-C Issued Date : September 7, 1998

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.

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 : BFYVRJ6A1NAT
Device Name : Video Cassette Recorder
Trade Name : TOSHIBA
Model Number : M-625
Serial Number : WS-0001 ☒ Prototype ☐ Pre-production ☐ Production
Date of Manufacture : July, 1998

3. Test Items and Procedure

☒ AC Power Line Conducted Emission Measurement
☒ Radiated Emission Measurement
☒ Output Signal Level Measurement
☒ Output Terminal Conducted Spurious Emission Measurement
☒ Transfer Switch Measurement

Above all tests were performed under : ANSI C63.4-1992

4. Date

Receipt of Test Sample : July 29, 1998
Test Completed on : August 20, 1998

CERTIFIED BY : S. Izumi

Seiichi Izumi
Manager of Ikoma Testing Laboratory

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1. GENERAL INFORMATION

1.1 Product Description

The TOSHIBA Model No.M-625 (referred to as the EUT in this report) is a Video Cassette Recorder containing RF modulator and Tuner.

1) Provided Terminals
   (1) RF Input Terminal
   (2) RF Output Terminal
   (3) A/V Input Terminals
   (4) A/V Output Terminals

2) RF Modulator Frequency : US CH. #3 Visual Carrier 61.25 MHz,
   Aural Carrier 65.75 MHz
   US CH. #4 Visual Carrier 67.25 MHz,
   Aural Carrier 71.75 MHz

3) Type of RF Output Connector : Type "F" Connector 75Ω (Unbalanced)

4) Used Oscillating Frequency except Local Oscillator
   16 MHz : CPU
   3.579545 MHz : YCA
   32 kHz : Real Time Clock

5) Rated Power Supply : AC 120 V, 60 Hz

1.2 Description for Equipment Authorization

1) Rules Part(s) under which Equipment operated

   FCC Rule Part 15, Subpart B : TV Interface Device in Unintentional Radiators.

2) Kind of Equipment Authorization

   (X) Certification ( ) Verification

3) Procedure of Application

   (X) Original Equipment ( ) Modification

1.3 Test Facility

All tests described in this report were performed by:

Name : KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC)
IKOMA TESTING LABORATORY
Open Test Site No.4
Shielded Room No.4

Address : 10630, 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 laboratory has 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 Internaitonal, UK), TUV Product Service(GER) and TUV Rheinland(GER) based on their criteria for testing laboratory (EN45001).

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2. TESTED SYSTEM

2.1 Test Mode

In each measurement (excluding antenna transfer switch measurement), the compliance tests were performed under following five EUT operation modes.
In transfer switch measurement, it was done under three modes (①~③).

① Playback mode
Playback the video tape that is recorded 1V peak-to-peak VITS signal.

② Record mode (1V VITS Signal Input)
1V peak-to-peak VITS signal is supplied through the VIDEO IN 1(rear side) terminal.

③ Record mode (5V VITS Signal Input)
5V peak-to-peak VITS signal is supplied through the VIDEO IN 1(rear side) terminal.

④ Record mode (0 dBmV NTSC TV Signal Input)
NTSC TV U.S. channel 13 video and audio signal is supplied through the ANTENNA IN terminal.

[Note]
Video Signal (0 dBmV at 211.25 MHz) is modulated by 1V peak-to-peak VITS signal.
Audio Signal (-10 dBmV at 215.75 MHz) is not modulated.

⑤ Record mode (25 dBmV NTSC TV Signal Input)
NTSC TV U.S. channel 13 video and audio signal is supplied through the ANTENNA IN terminal.

[Note]
Video Signal (25 dBmV at 211.25 MHz) is modulated by 1V peak-to-peak VITS signal.
Audio Signal (15 dBmV at 215.75 MHz) is not modulated.

In each mode, the spectrum was checked and the data of the maximum EUT operation was reported.

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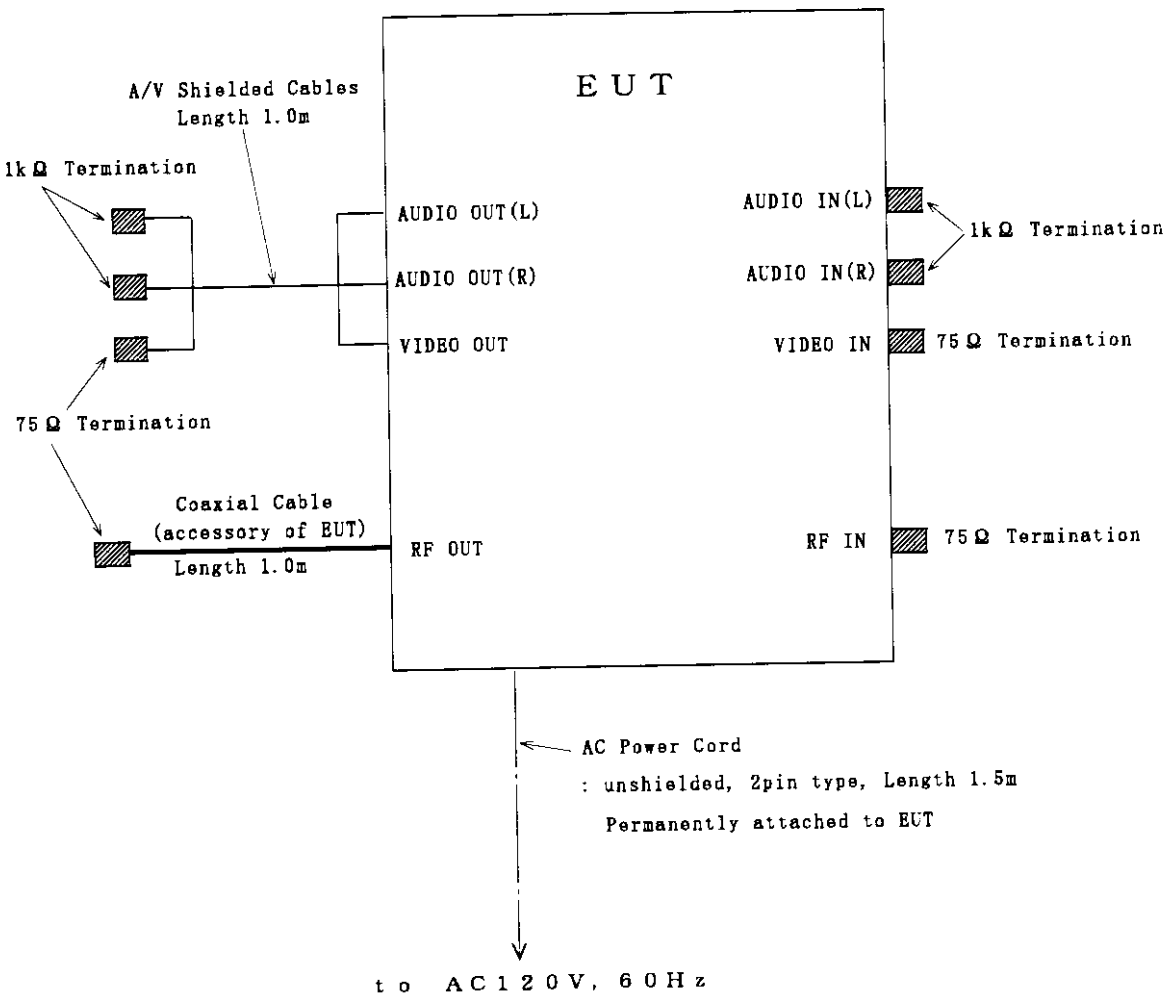
2.2 Block Diagram of EUT System
for Conducted and Radiated Emission Measurements

① Playback mode



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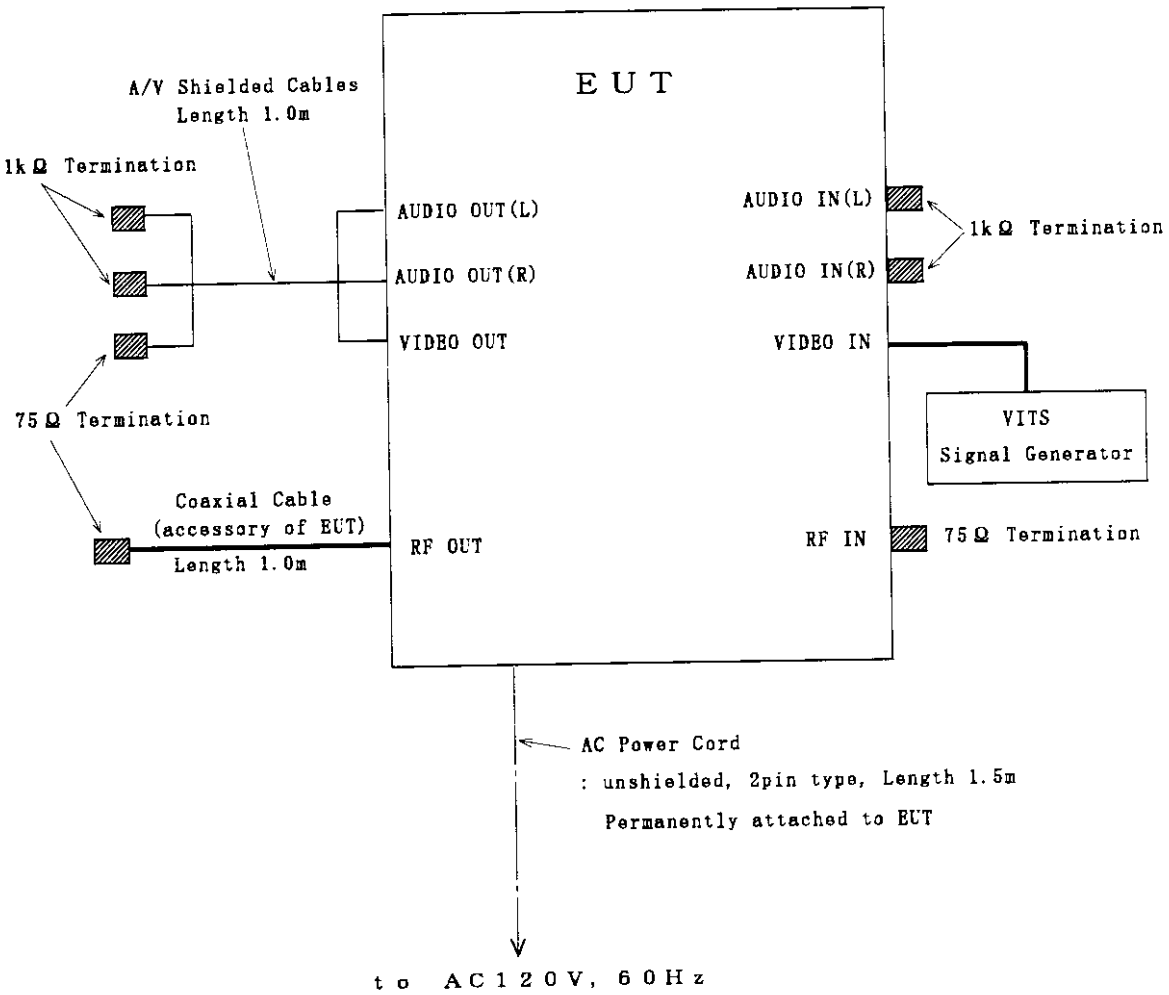
- Continued -

② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)



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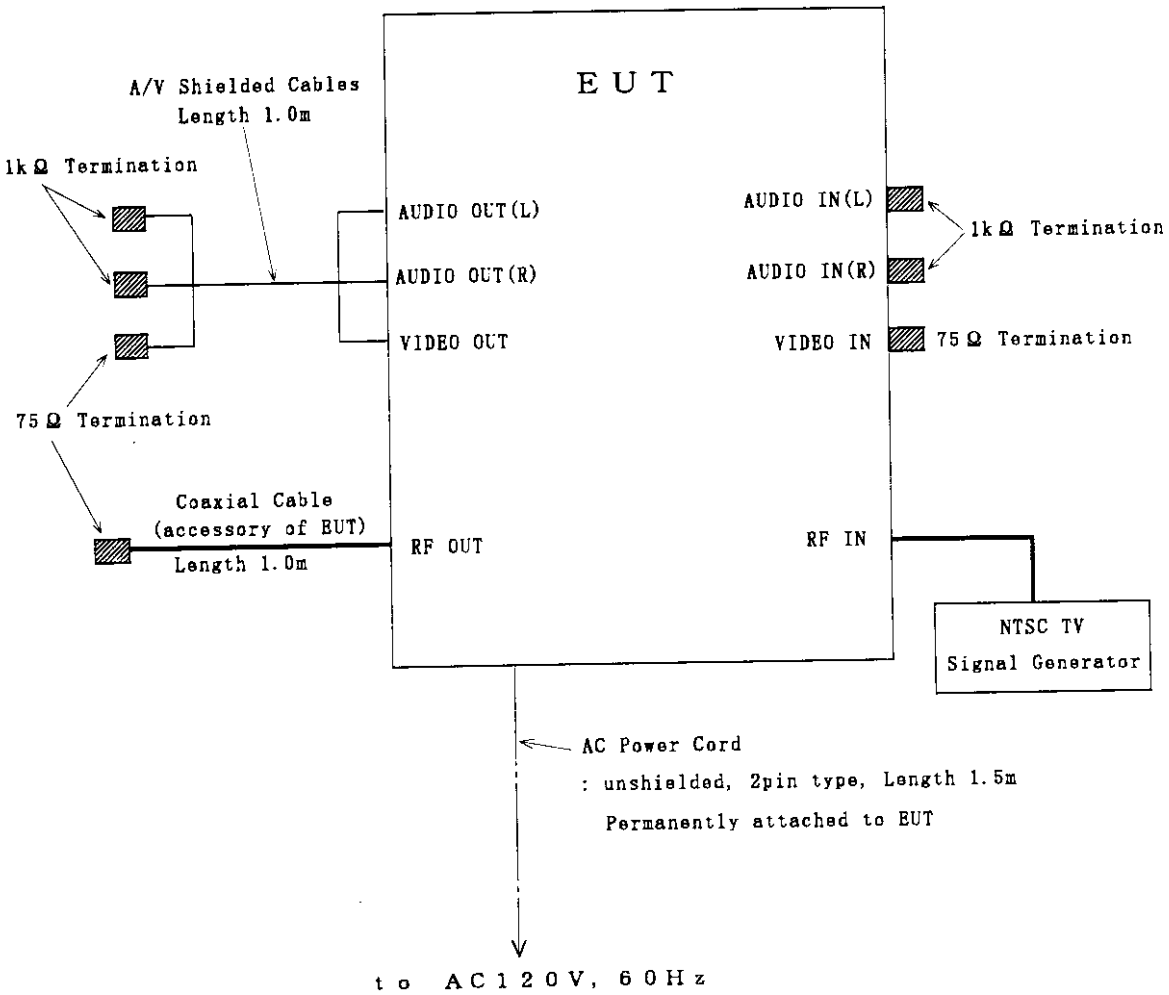
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)



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3. AC POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.107(a).

3.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 7. 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 equipment power cord are 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 require.

6) Using a calibrated coaxial cable, connect the spectrum analyzer(*1) to the mesuring port of the LISN for the EUT.

7) To find out an EUT System condition produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

8) The spectrum are scanned from 450 kHz to 30 MHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

9) The test receiver(*2) is connected to the LISN for the EUT, and the minimum six highest emissions 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

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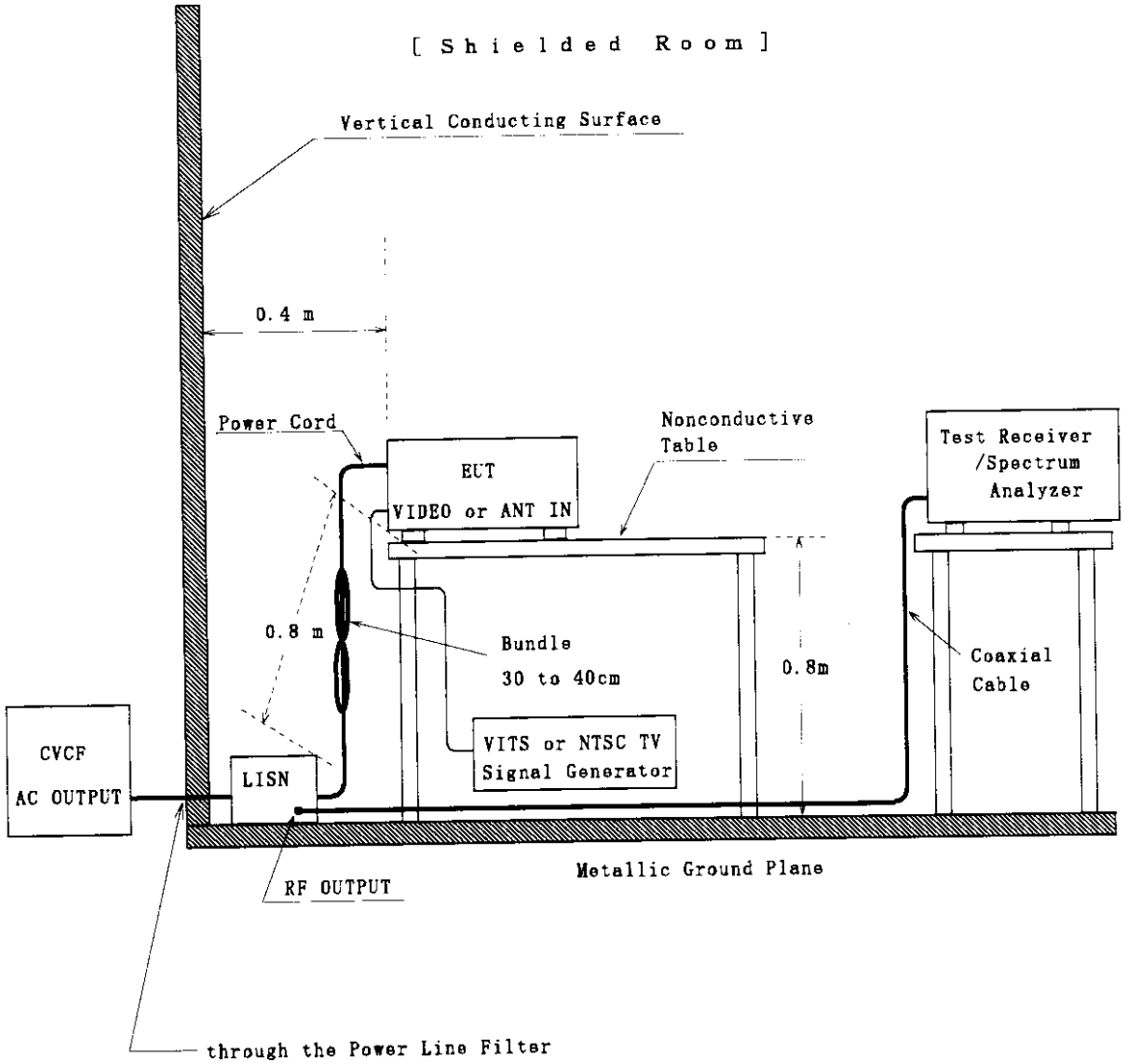
3.3 Test Configuration



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3.5 Test Results

Emission Frequency [MHz]	LISN Corr. Factor [dB]	Meter Reading: One-end to Ground [dBμV]	Meter Reading: Other-end to Ground [dBμV]	Maximum R F Voltage [dBμV]	Limit [dBμV]	Maximum E U T Operation (*)
Test Channel #3						
16.00	0.7	34.1	33.2	34.8	48.0	④⑤
20.76	0.9	34.4	33.3	35.3	48.0	④⑤
24.00	1.1	36.8	35.2	37.9	48.0	②③
28.00	1.3	35.9	34.6	37.2	48.0	①
29.30	1.3	37.9	36.1	39.2	48.0	①
29.92	1.3	36.9	35.7	38.2	48.0	①

[Environment]

Temperature : 25 ℃ Humidity : 60 %

[Note]

1) LISN Correction Factor includes the cable loss.

2) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

3) The emissions at channel #3 were nearly equal to channel #4.

[Sample calculation]

Frequency : 16.00 [MHz]
Meter Reading : 34.1 [dBμV] (at One-end to Ground)
LISN Corr. Factor : 0.7 [dB]

Then, RF voltage is calculated as follows.

RF Voltage = 34.1 + 0.7 = 34.8 [dBμV]

[Summary of Test Results]

Minimum margin was 8.8 dB at 29.30 MHz, one-end to ground.

Tested Date : August 20, 1998

Signature Y. Kotani
Yoshiko Kotani

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4. RADIATED EMISSION MEASUREMENT

4.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.109(a),(c) and 15.115(a).

4.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 8. 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 turn floor.

3) Warm up the EUT System.

4) Activate the EUT System and run the prepared software for the test, if require.

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.

6) To find out an EUT System condition produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

7) The spectrum are scanned from 30 MHz to 1 GHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

8) In final compliance test, the minimum six highest emissions recorded above are measured at the specified distance using the broad band antenna or the tuned dipole antenna and the test receiver(*2).

[Note]

(*1) : Spectrum Analyzer Set Up Conditions
- Frequency range : 30 - 1000 MHz
- Resolution bandwidth : 100 kHz
- Detector function : Peak mode

(*2) : Test Receiver Set Up Conditions
- Detector function : Quasi-Peak
- IF bandwidth : 120 kHz

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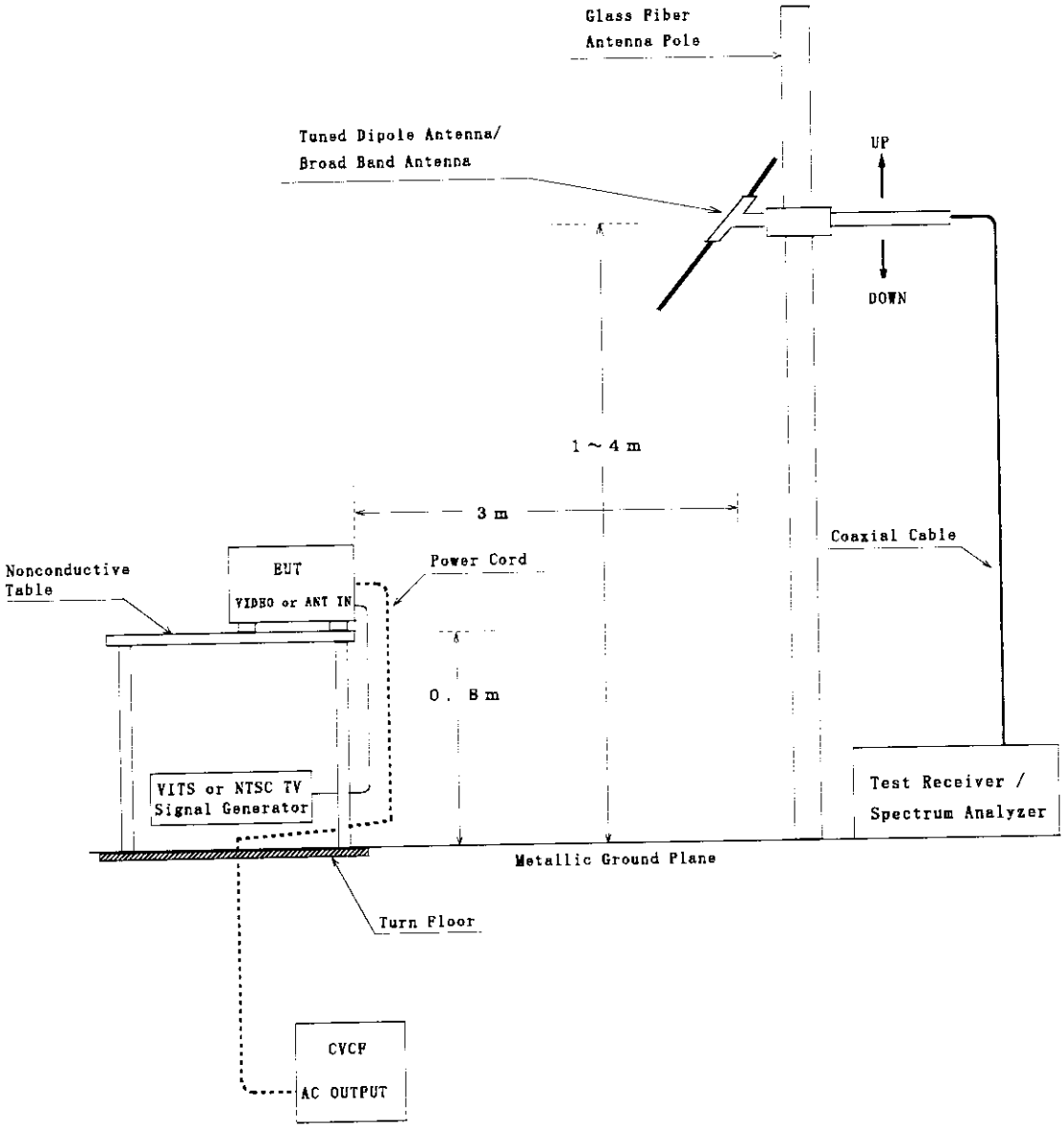
4.3 Test Configuration

[O p e n S i t e]



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4.5 Test Results

[Distance : 3 m]

Emission Frequency [MHz]	Antenna Factor [dB]	Meter Reading Horizontal Polarization [dBμV]	Meter Reading Vertical Polarization [dBμV]	Maximum Field Strength [dBμV/m]	Limits [dBμV/m]	Maximum E U T Operation (*)
Test Channel #3						
61.25	9.1	<0.0	<3.0	<12.1	40.0	①~⑤
65.75	8.5	<3.0	<3.0	<11.5	40.0	①~⑤
122.50	15.1	<0.0	<0.0	<15.1	43.5	①~⑤
245.00	20.2	<0.0	<0.0	<20.2	46.0	①~⑤
Test Channel #4						
67.25	8.4	<3.0	<3.0	<11.4	40.0	①~⑤
71.75	8.0	<3.0	<3.0	<11.0	40.0	①~⑤
134.50	16.2	<0.0	<0.0	<16.2	43.5	①~⑤
201.75	18.9	<0.0	<0.0	<18.9	43.5	①~⑤
Other emissions						
30.00	18.7	3.1	13.9	32.6	40.0	②③
71.60	8.0	20.0	15.8	28.0	40.0	④⑤
80.00	7.9	22.5	15.5	30.4	40.0	④⑤
85.90	9.0	13.0	17.0	26.0	40.0	④⑤
114.53	14.2	14.5	15.6	29.8	43.5	④⑤
128.86	15.6	12.3	11.9	27.9	43.5	③
168.00	17.9	15.2	12.1	33.1	43.5	②③
200.45	18.9	18.9	14.6	37.8	43.5	①
229.10	19.7	14.2	9.0	33.9	46.0	④⑤
257.73	20.8	8.7	5.5	29.5	46.0	①
315.00	17.2	14.2	9.8	31.4	46.0	④⑤
357.97	18.3	12.1	13.2	31.5	46.0	①
687.32	25.1	9.7	7.5	34.8	46.0	①
715.90	25.5	8.5	6.3	34.0	46.0	①

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[Environment]

Temperature : 25 ℃ Humidity : 61 %

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

2) Antenna factor includes the cable loss.

[Sample calculation]

Frequency : 30.00 [MHz] (Other emission)
Meter Reading : 13.9 [dBμV] (at Vertical Polarization)
Antenna Factor : 18.7 [dB]

Then, Field Strength is calculated as follows.

Field Strength = 13.9 + 18.7 = 32.6 [dBμV/m]

[Summary of Test Results]

Minimum margin was 5.7 dB at 200.45 MHz, other emissions : horizontal polarization.

Tested Date : August 17, 1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

5. OUTPUT SIGNAL LEVEL MEASUREMENT

5.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.115(b)(1)(ii).

5.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.2.

2) Unused RF input/output terminals are terminated in the proper impedance.

3) Activate the EUT system.

4) Set the spectrum analyzer as follows.

Frequency Span	: 1 MHz
Resolution bandwidth	: 100 kHz
Video bandwidth	: 3 MHz
Detector function	: Peak mode

5) The RF output terminal is connected to the spectrum analyzer through the matching transformer with a calibrated 50 ohms coaxial cable.

6) Then, the RF output signal level is measured under the EUT condition produced the maximum signal level.

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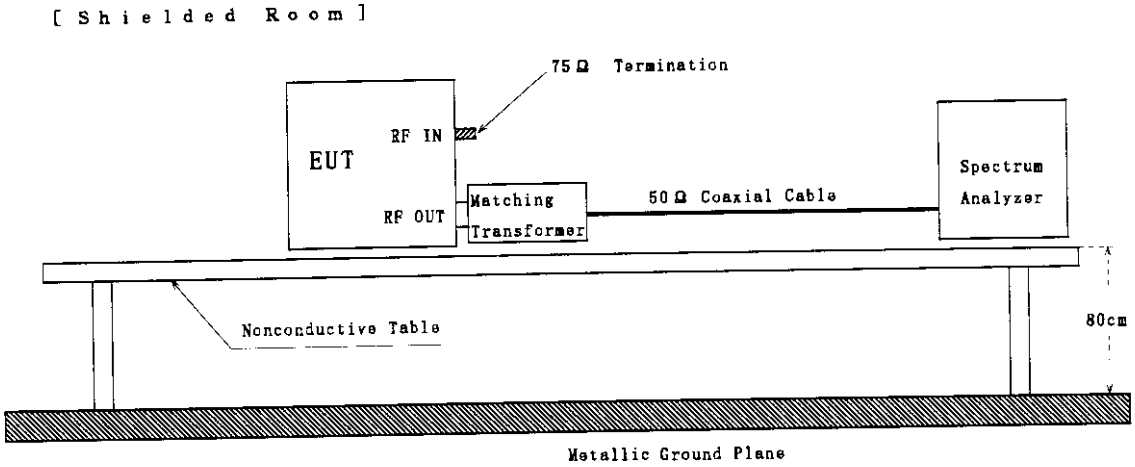
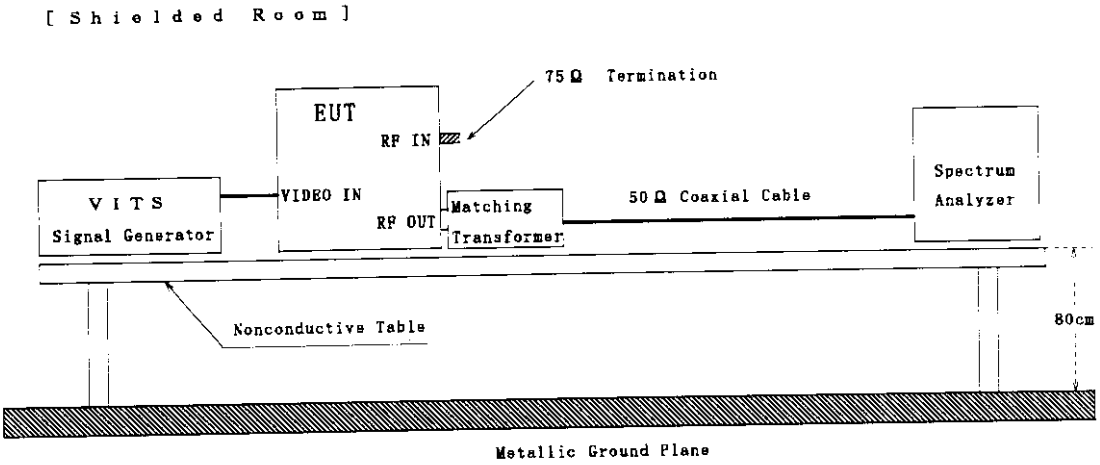
5.3 Test Configuration

① Playback mode



② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)



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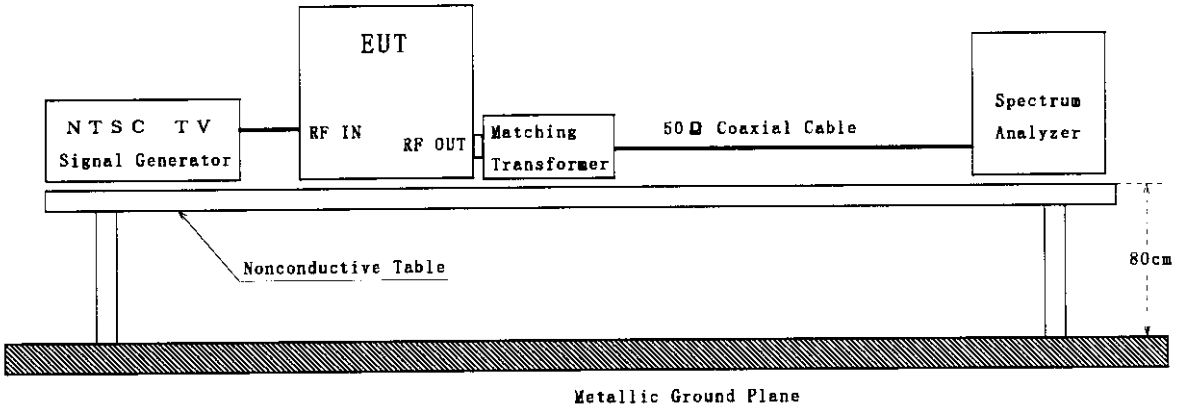
④ Record mode (0dBmV NTSC TV Signal Input)
⑤ Record mode (25dBmV NTSC TV Signal Input)

[Shielded Room]



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5.5 Test Results

Emission Frequency [MHz]	Corr. Factor [dB]	Meter Reading [dBμV/50Ω]	Maximum Signal Level [dBμV/75Ω]	Limits [dBμV/75Ω]	Maximum EUT Operation (*)
Test Channel #3					
61.25	2.3	63.1	65.4	69.5	②③
65.75	2.3	48.3	50.6	56.5	⑤
Test Channel #4					
67.25	2.3	63.4	65.7	69.5	②
71.75	2.3	48.2	50.5	56.5	⑤

[Environment]

Temperature : 25 ℃ Humidity : 60 %

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

2) The correction factor consist of the voltage loss of the impedance matching transformer and the coaxial cable used for the test.

[Sample calculation]

Frequency : 61.25 [MHz] (Test Channel #3)
Meter Reading : 63.1 [dBμV/50Ω]
Correction Factor : 2.3 [dB]

Then, the output signal level is calculated as follows.

Signal Level = 63.1 + 2.3 = 65.4 [dBμV/75Ω]

[Summary of Test Results]

Minimum margin was 3.8 dB at 67.25 MHz, test channel #4.

Tested Date : August 20, 1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

6. OUTPUT TERMINAL CONDUCTED SPURIOUS EMISSION MEASUREMENT

6.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.115(b)(2)(ii).

6.2 Test Procedure

1) The EUT system and measuring instrument are set up in the same manner of the output signal measurement.

2) Unused RF input/output terminals are terminated in the proper impedance.

3) Activate the EUT system.

4) The spectrum was scanned from 30 MHz to more than 4.6 MHz below the visual carrier frequency, and from more than 7.4 MHz above the visual carrier frequency to 1000 MHz, and the three highest emissions are selected under the EUT condition produced the maximum signal level at each frequency range.

5) The selected emissions are measured.
The spectrum analyzer is set as follow.

Frequency span	: 1 MHz
Resolution bandwidth	: 100 kHz
Video bandwidth	: 3 MHz
Detector function	: Peak mode

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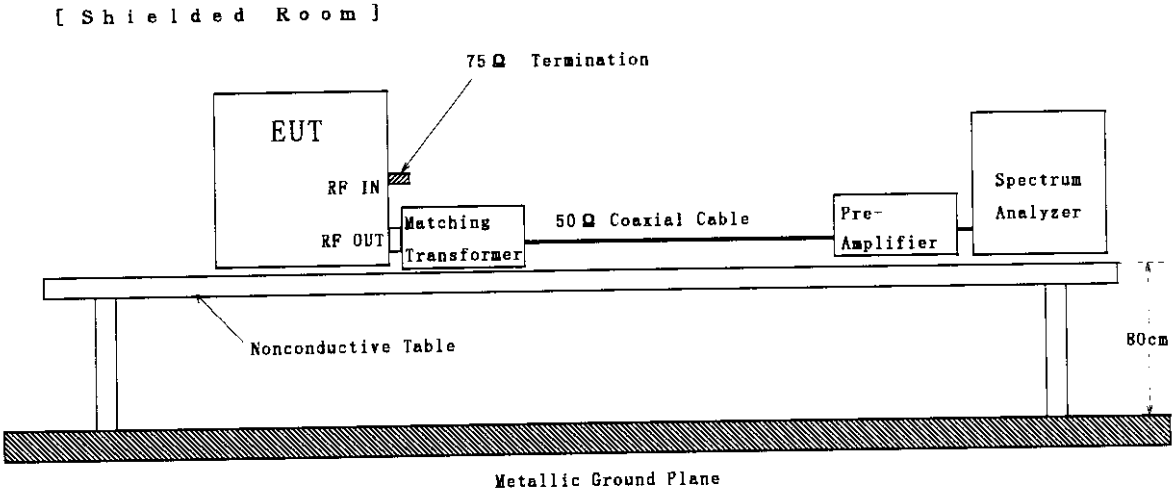
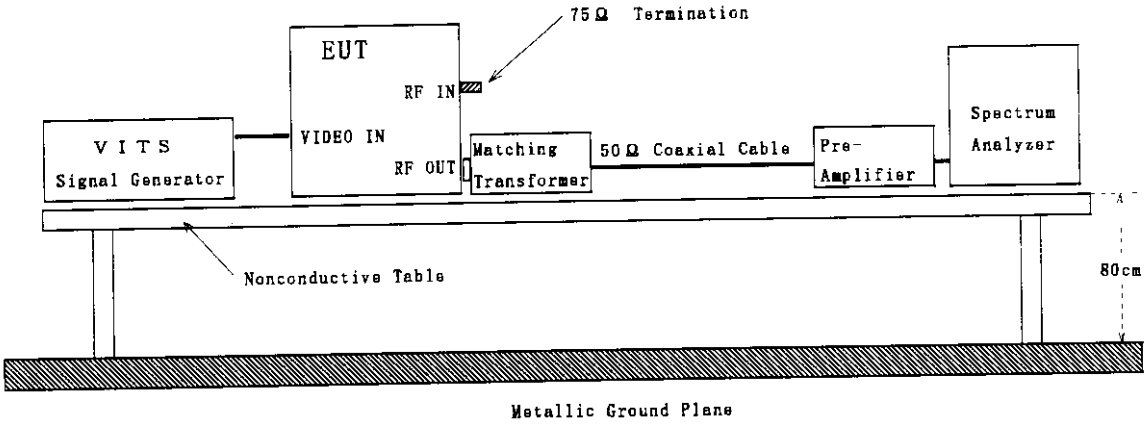
6.3 Test Configuration

① Playback mode



② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)



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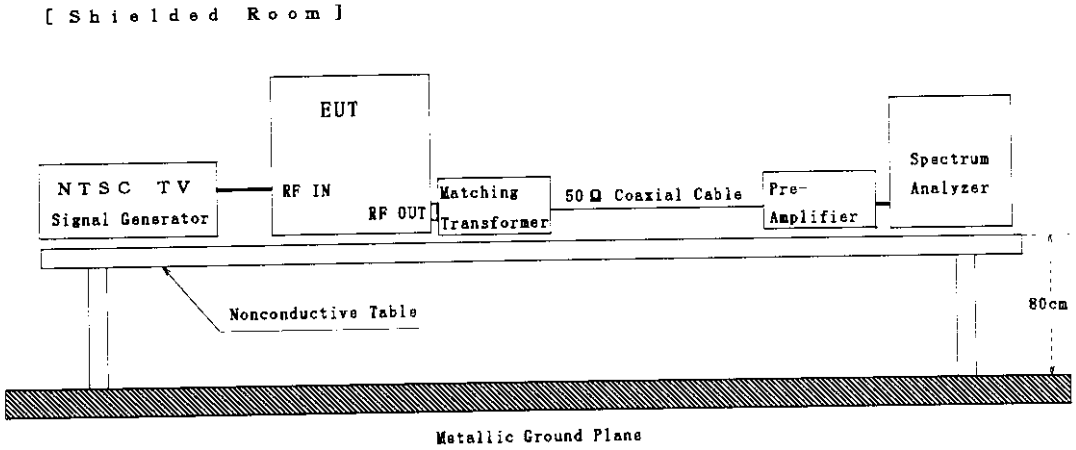
④ Record mode (0dBmV NTSC TV Signal Input)
⑤ Record mode (25dBmV NTSC TV Signal Input)



6.4 Photographs of EUT System Configuration

The tested device configuration is the same as the output signal level measurement. (See 5.4 Photographs of EUT System Configuration.)

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6.5 Test Results

Emission Frequency [MHz]	Corr. Factor [dB]	Meter Reading [dBμV/50Ω]	Maximum Signal Level [dBμV/75Ω]	Limit [dBμV/75Ω]	Maximum EUT Operation (*)
Test Channel #3					
52.34	2.3	23.6	25.9	39.5	③
55.87	2.3	30.5	32.8	39.5	①③
56.65	2.3	40.3	42.6	39.5	③
69.61	2.3	21.4	23.7	39.5	①
70.27	2.3	24.4	26.7	39.5	①③
183.76	2.3	12.7	15.0	39.5	①②④⑤
** 56.65	2.3	21.3	23.6	39.5	③
Test Channel #4					
58.25	2.3	23.5	25.8	39.5	③
61.86	2.3	31.9	34.2	39.5	①
62.65	2.3	40.4	42.7	39.5	③
76.25	2.3	24.1	26.4	39.5	③
78.56	2.3	17.8	20.1	39.5	③
201.76	2.3	11.4	13.7	39.5	①
** 62.65	2.3	22.8	25.1	39.5	③

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- Continued -

[Environment]

Temperature : 25 ℃ Humidity : 60 %

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

2)** : To except the effect of lower sideband of sound sub-carrier frequency component, if set the resolution bandwidth of spectrum analyzer to 30 kHz, these interference become to this value.

3) The correction factor consist of the voltage loss of the impedance matching transformer and the coaxial cable used for the test. And the meter readings described above are corrected by the gain of pre-amplifier.

[Sample calculation]

Frequency : 52.34 [MHz] (Test Channel #3)
Meter Reading : 23.6 [dBμV/50Ω]
Correction Factor : 2.3 [dB]

Then, the emission level is calculated as follows.

Signal Level = 23.6 + 2.3 = 25.9 [dBμV/75Ω]

[Summary of Test Results]

Minimum margin was 5.3 dB at 61.86 MHz, test channel #4.

Tested Date : August 20, 1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

7. TRANSFER SWITCH MEASUREMENT

7.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.115(c)(1)(ii).

7.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.2.

2) Activate the EUT system.

3) Unused RF output terminal is terminated in the proper impedance.

4) Set the spectrum analyzer as follows.

Frequency Span	: 1 MHz
Resolution bandwidth	: 100 kHz
Video bandwidth	: 3 MHz
Detector function	: Peak mode

5) The antenna input terminal is connected to the input of pre-amplifier through the matching transformer with a calibrated 50 ohms coaxial cable. And the output of pre-amplifier is connected to the spectrum analyzer.

6) Then, the signal level on the antenna input terminal is measured under the EUT condition produced the maximum signal level.

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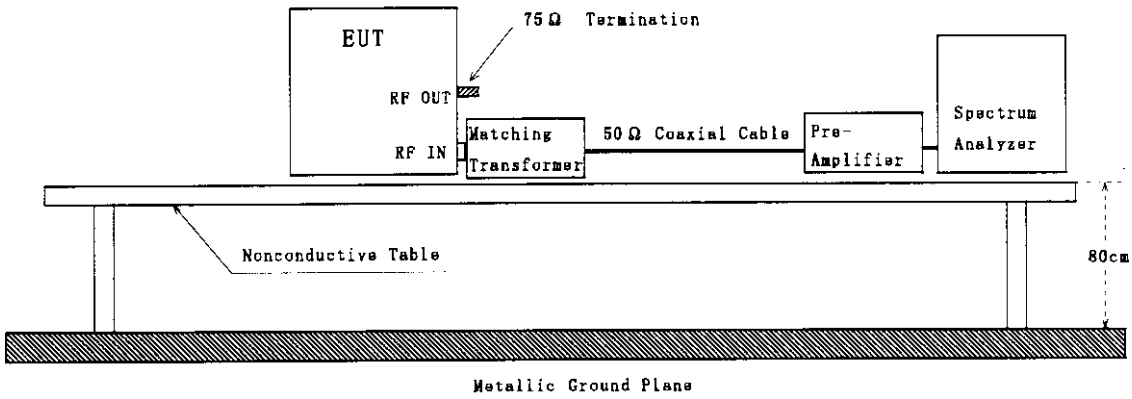
7.3 Test Configuration

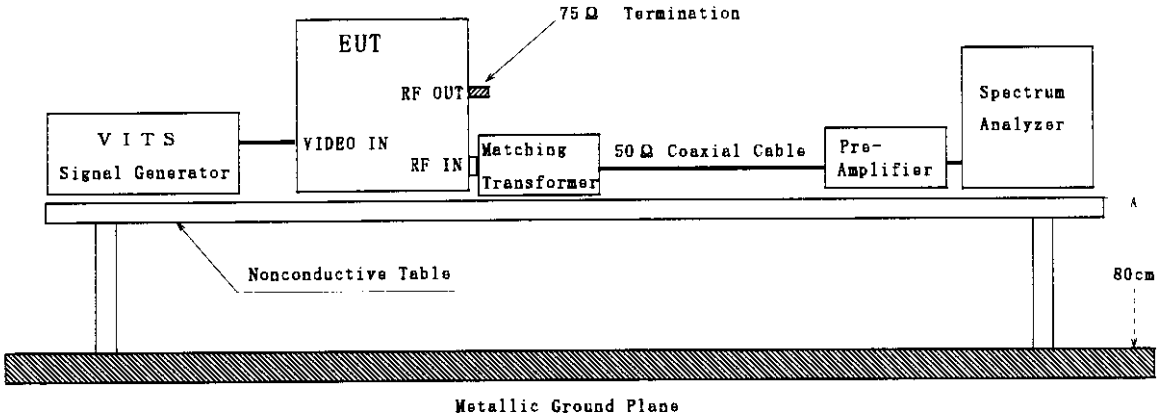
① Playback mode

[S h i e l d e d R o o m]



② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)

[S h i e l d e d R o o m]



ENGINEERING TEST REPORT

7.5 Test Results

Emission Frequency [MHz]	Corr. Factor [dB]	Meter Reading [dBμV/50Ω]	Maximum Signal Level [dBμV/75Ω]	Limit [dBμV/75Ω]	Maximum EUT Operation (*)
Test Channel #3					
61.25	2.3	3.8	6.1	9.5	①~③
Test Channel #4					
67.25	2.3	4.3	6.6	9.5	①~③

[Environment]

Temperature : 25 ℃ Humidity : 60 %

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)

2) The correction factor consist of the voltage loss of the impedance matching transformer and the coaxial cable used for the test. And the meter readings described above are corrected by the gain of pre-amplifier.

[Sample calculation]

Frequency : 61.25 [MHz] (Test Channel #3)
Meter Reading : 3.8 [dBμV/50Ω]
Correction Factor : 2.3 [dB]

Then, the signal level is calculated as follows.

Signal Level = 3.8 + 2.3 = 6.1 [dBμV/75Ω]

[Summary of Test Results]

Minimum margin was 2.9 dB at 67.25 MHz, test channel #4.

Tested Date : August 20, 1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

8. LIST OF TEST INSTRUMENTS

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
Test Receiver	Rohde & Schwarz	ESH3	Frequency Range 9 kHz - 30 MHz	FS-48-2	3	1998/6	1999/6
		ESVS10	Frequency Range 20 MHz - 1 GHz	FS-82	4	1998/2	1999/2
Spectrum Analyzer	Hewlett Packard	8568B	Frequency Range 100 Hz - 1.5 GHz	FS-46-3	3,5, 6,7	1998/6	1999/6
	Advantest	R3261C	Frequency Range 9 kHz - 2.6 GHz	SA-41	4	1998/8	1999/8
Pre-Amplifier	Anritsu	MH648A	Frequency Range 100 kHz - 1.2 GHz	AM-28	6,7	1998/6	1999/6
Line Impedance Stabiliza-tion Network	Kyoritsu	KNW-407	Frequency Range 150 kHz - 30 MHz Impedance 50 Ω / 50 μH Capacity AC250V, 15A	FL-107	3	1998/4	1999/4
Biconical Antenna	Schwarzbeck	BBA9106	Frequency Range 30 MHz - 300 MHz	AN-94	4	1998/2	1999/2
Log-Periodic Antenna	Schwarzbeck	UHALP 9108A	Frequency Range 300 MHz - 1 GHz	AN-217	4	1998/2	1999/2
Turned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25 MHz - 500 MHz	AN-135	—	1998/2	1999/2
		KBA-611S	Frequency Range 500 MHz - 1 GHz	AN-137	—	1998/2	1999/2

ENGINEERING TEST REPORT

- Continued -

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
Video Part Signal Generator	Anritsu	MG3601A	Frequency Range 100 kHz - 1.04 GHz	SG-41	3,4, 5,6	1997/9	1998/9
Audio Part Signal Generator	Anritsu	MG3601A	Frequency Range 100 kHz - 1.04 GHz	SG-48	3,4, 5,6	1997/9	1998/9
Multiburst Signal Generator	Anritsu	MG318A	According to ANSI C63.4(1992) Section 12 Fig.15	MG-35	3,4, 5,6,7	1997/12	1998/12
Matching Trans-former	Anritsu	MG614A	Frequency Range 10 MHz - 1.2 GHz	AX-28-2	5,6,7	1997/11	1998/11
				AX-28-4	3,4, 5,6	1997/11	1998/11
Four-Port Junction Pad	Anritsu	MP659A	Frequency Range 40 MHz - 1 GHz	AX-16	3,4, 5,6	1997/11	1998/11

Designated by Ministry of International Trade and Industry

KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE
6-8-7, NISHITEMMA
KITA-KU, OSAKA, 530 JAPAN

KEC

IKOMA
TESTING LABORATORY
10630, TAKAYAMA-CHO
IKOMA-CITY, NARA, 630-01 JAPAN

Corporate Juridical Person

ENGINEERING TEST REPORT

REPORT NO. A-023-98-C1 Issued Date : September 7, 1998

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.

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

Device Name : Video Cassette Recorder
Trade Name : TOSHIBA
Model Number : M-625
Serial Number : WS-0001 ☒ Prototype ☐ Pre-production ☐ Production
Date of Manufacture : July, 1998

3. Test Items and Procedure

☒ AC Power Line Conducted Emission Measurement
☒ Radiated Emission Measurement
☒ Antenna Power Conduction Measurement
☒ Picture Sensitivity Measurement
☒ Noise Figure Measurement

Above all tests were performed under :
ANSI C63.4-1992, FCC/OET MP-2
IEEE Std 187-1990, IEEE Std 190, IEEE Std 213-1987

4. Date

Receipt of Test Sample : July 29, 1998
Test Completed on : August 31, 1998

CERTIFIED BY : S. Izumi

Seiichi Izumi
Manager of Ikoma Testing Laboratory

ENGINEERING TEST REPORT

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ENGINEERING TEST REPORT

1. GENERAL INFORMATION

1.1 Product Description

The TOSHIBA Model No.M-625 (referred to as the EUT in this report) is a Video Cassette Recorder containing RF modulator and Tuner.

1) Provided Terminals

(1) RF Input Terminal
(2) RF Output Terminal
(3) A/V Input Terminals
(4) A/V Output Terminals

2) Tuning Range

TV : VHF/2~13ch., UHF/14~69ch.
CATV : VHF/5A, LOW/A-5~A-1, MID/A~I,SUPER/J~W,HYPER/W+1~W+58, W+59~W+84

3) Type of Circuit

Superheterodyne, IF : 45.75 MHz

4) Type of Antenna Input Connector : Type "F" Connector 75Ω (Unbalanced)

5) Rated Power Supply : AC 120 V, 60 Hz

1.2 Description for Equipment Authorization

1) Rules Part(s) under which Equipment operated

FCC Rule Part 15, Subpart B : TV Broadcast Receiver in Unintentional Radiators.

2) Kind of Equipment Authorization

( ) Certification (x) Verification

3) Procedure of Application

(x) Original Equipment ( ) Modification

1.3 Test Facility

N a m e : KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC)
IKOMA TESTING LABORATORY
Open Test Site No.4
Shielded Room No.4

Address : 10630, 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 laboratory has 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 Internaitonal, UK), TUV Product Service(GER) and TUV Rheinland(GER) based on their criteria for testing laboratory (EN45001).

ENGINEERING TEST REPORT

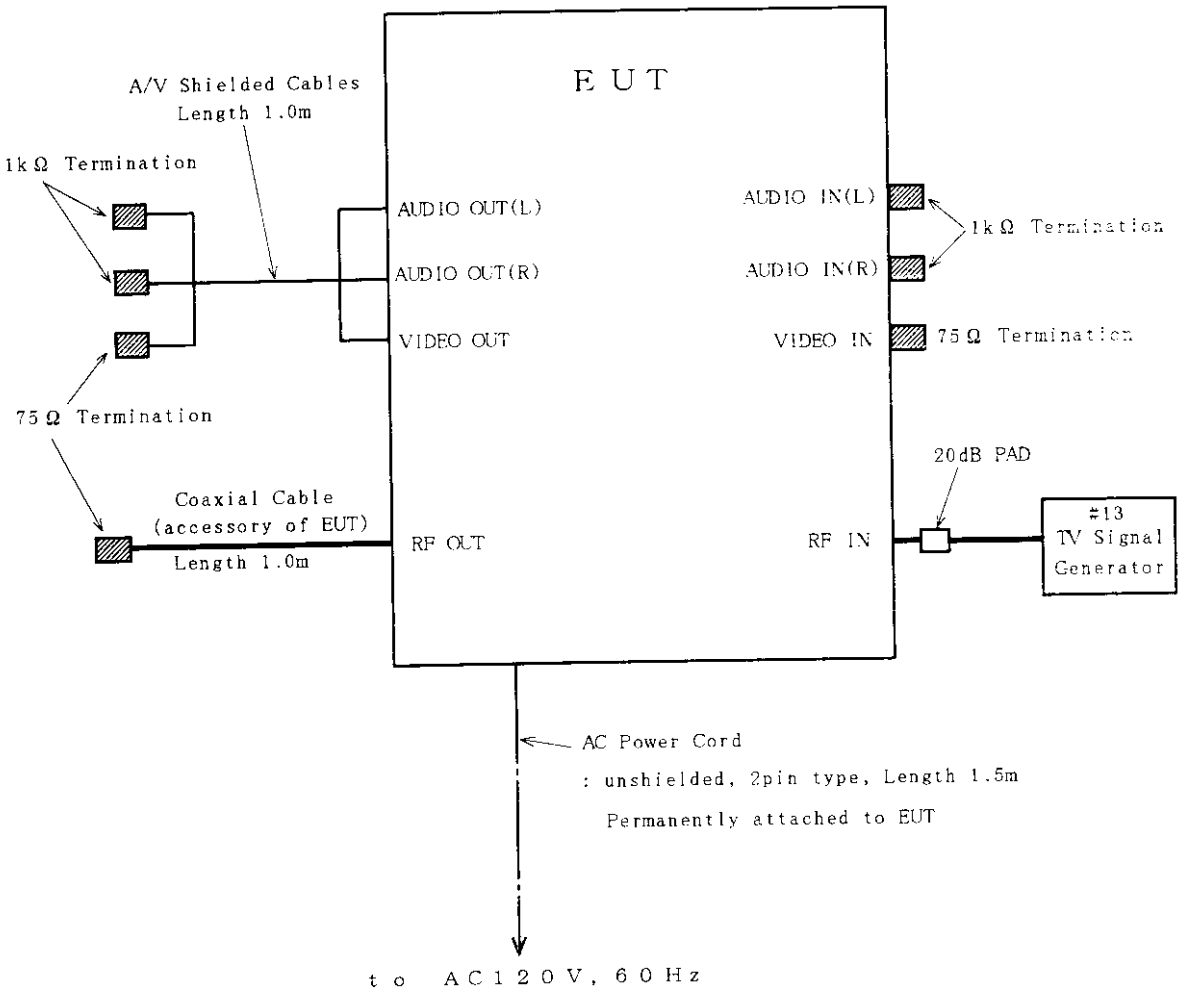
2. TESTED SYSTEM

2.1 Test Planning and Test Mode

Tests were performed with the accessories normally marketed with the device.

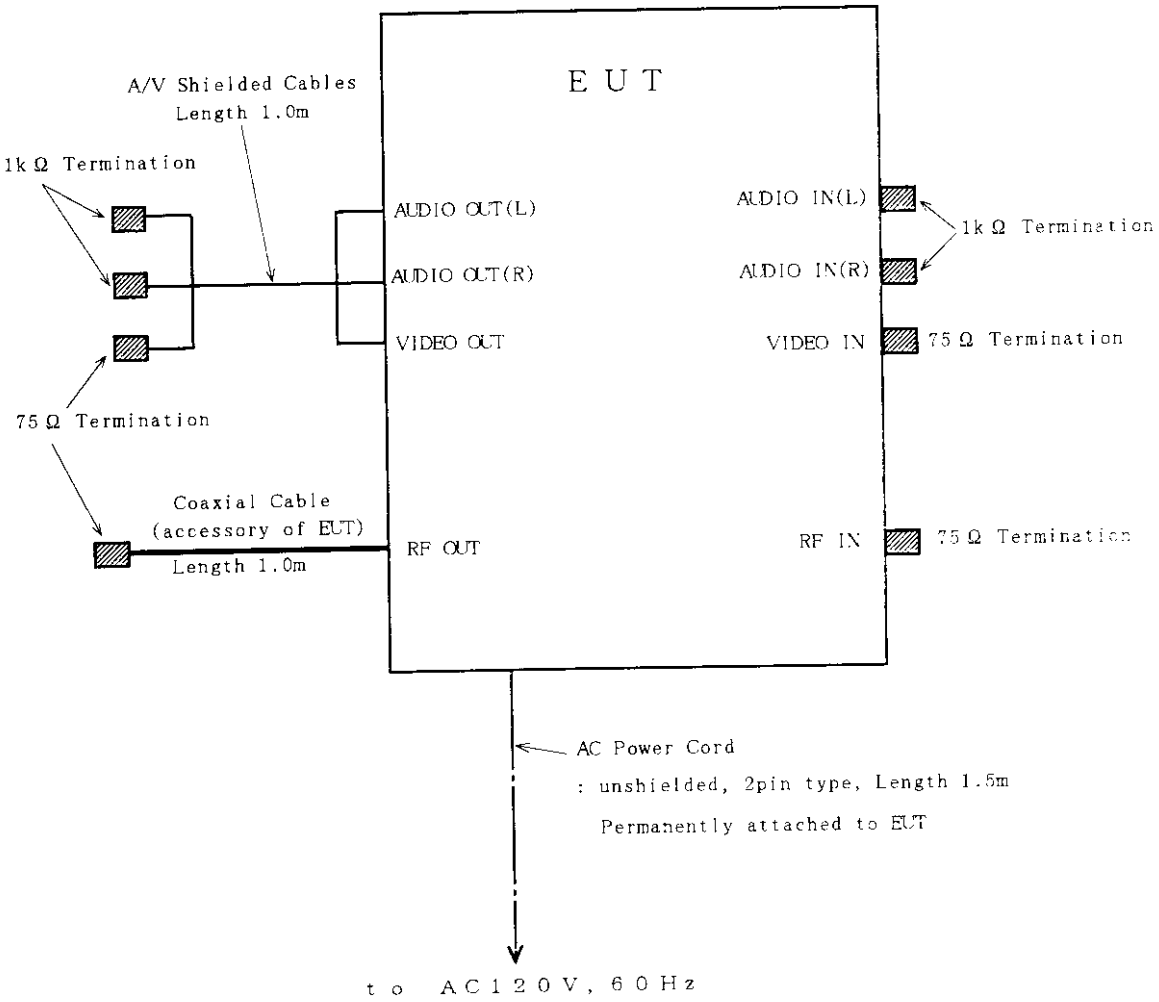
2.2 Block Diagram of EUT System

2.2.1 AC Power Line Conducted Emission Measurement



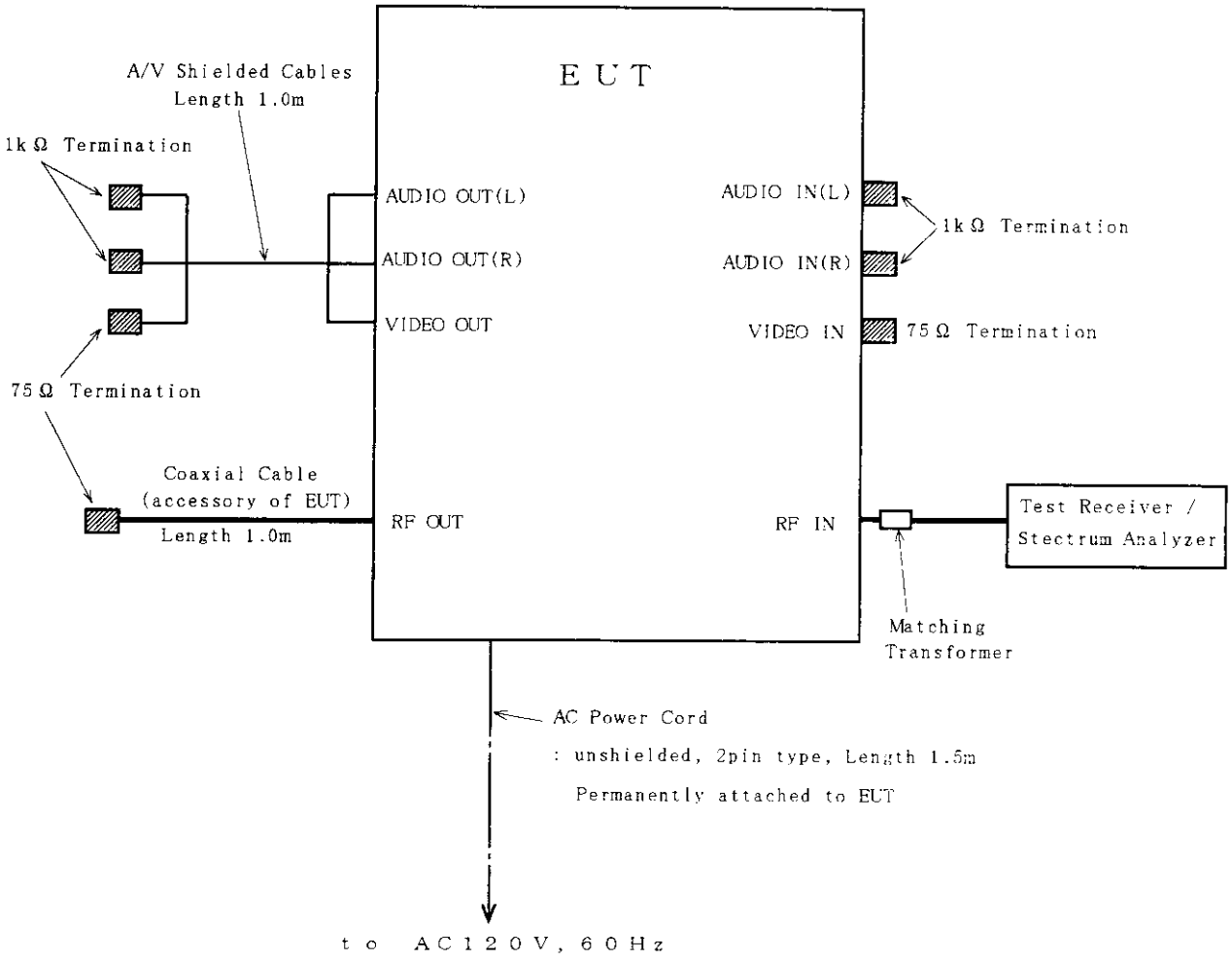
ENGINEERING TEST REPORT

2.2.2 Radiated Emission Measurement



ENGINEERING TEST REPORT

2.2.3 Antenna Power Conduction Measurement



ENGINEERING TEST REPORT

3. AC POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.107(a).

3.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 7 and 12.1, IEEE Std 213-1987. See also the block diagram and the photographs of EUT System configuration in this report.

2) Connect the EUT's AC power cord to Line Impedance Stabilization Network(LISN).

3) Warm up the EUT System.

4) Activate the EUT System and run the software prepared for the test, if require.

5) The standard TV signal is supplied to the EUT through a 20dB,75Ω antenna coupling pad. The tested TV channel is US 13ch.

6) Using a calibrated coaxial cable, connect the spectrum analyzer(*1) to the measuring port of the LISN for the EUT.

7) To find out an EUT System condition produces the maximum emission, change the EUT System configuration, the position of the cables, and the EUT operation mode under normal usage of the EUT.

8) The spectrum are scanned from 450 kHz to 30 MHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

9) The test receiver(*2) is connected to the LISN for the EUT, and the minimum six highest emissions recorded above are measured.

[Note]

(*1) : Spectrum Analyzer Set Up Conditions

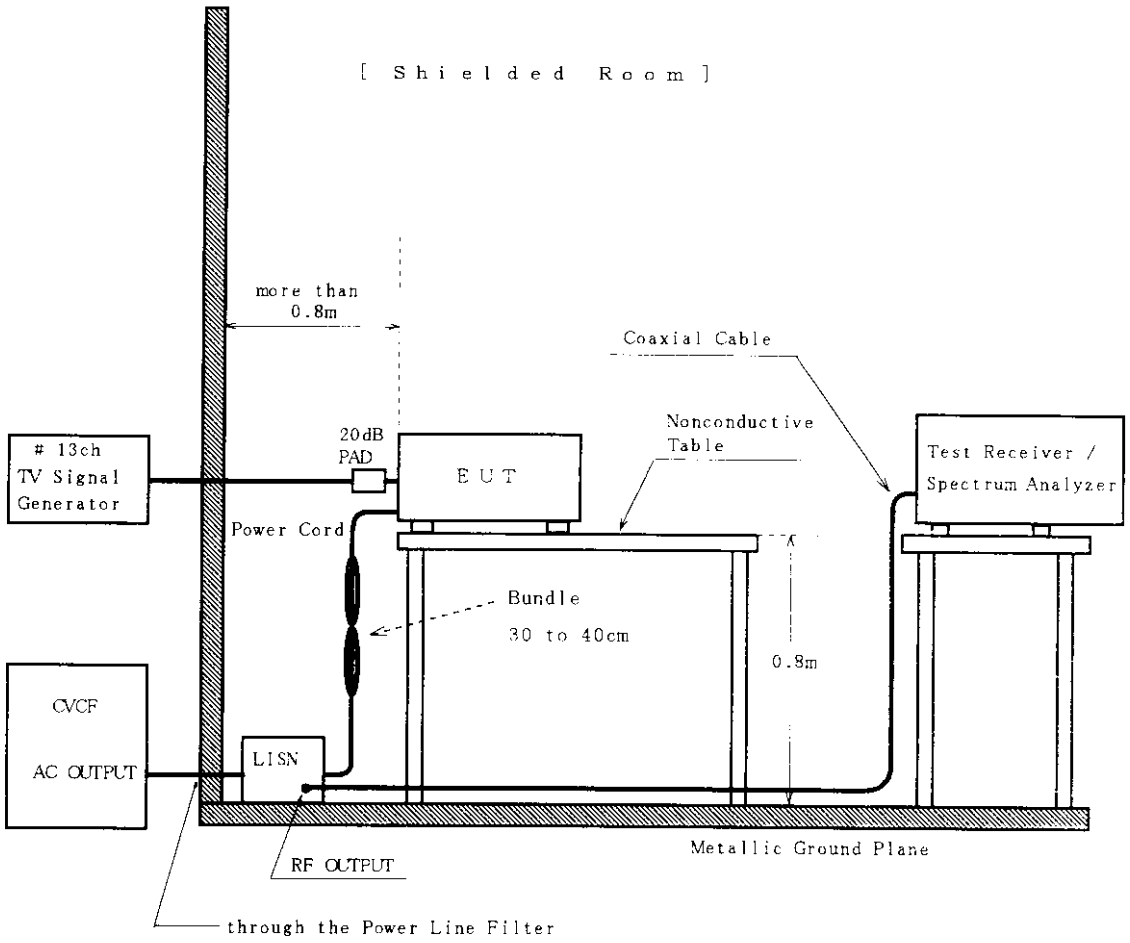
Frequency range	:	450 kHz - 30 MHz
Resolution bandwidth	:	10 kHz
Video bandwidth	:	1 MHz

(*2) : Test Receiver Set Up Conditions

Detector function	:	Quasi-Peak / Average (if necessary)
IF bandwidth	:	9 kHz

ENGINEERING TEST REPORT

3.3 Test Configuration



ENGINEERING TEST REPORT

3.5 Test Results

Emission Frequency [MHz]	LISN Correction Factor [dB]	Meter Reading [dBμV] One-end to Ground	Meter Reading [dBμV] Other-end to Ground	Maximum RF Voltage [dBμV]	Limit [dBμV]
(Measurement with the Quasi-Peak detector)					
0.4500	0.1	16.2	15.4	16.3	48.0
2.135	0.1	17.3	17.0	17.4	48.0
16.00	0.7	25.2	25.6	26.3	48.0
28.95	1.3	34.8	34.5	36.1	48.0
29.14	1.3	34.8	35.0	36.3	48.0
30.00	1.3	34.0	34.5	35.8	48.0

[Note]
LISN Correction Factor includes the cable loss.

[Environment]
Temperature : 27 ℃ Humidity : 60 %

[Sample Calculation]
Frequency : 0.4500 [MHz]
Meter Reading : 16.2 [dBμV] (at One-end to Ground)
LISN Corr. Factor : 0.1 [dB]

Then, RF voltage is calculated as follows.

RF Voltage = 16.2 + 0.1 = 16.3 [dBμV]

[Summary of Test Results]

Minimum margin was 11.7 dB at 29.14 MHz, other-end to ground.

Tested Date : August 21, 1998 Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

4. RADIATED EMISSION MEASUREMENT

4.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.109(a)(c)(f).

4.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.1, IEEE Std 187-1990, 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 cord for the EUT System is connected the receptacle on the metallic turn floor.

3) Warm up the EUT System.

4) Activate the EUT System and run the prepared software for the test, if require.

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 produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

7) The spectrum are scanned from 30 MHz to 1.7 GHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

8) In final compliance test, the local oscillator emissions and the minimum six highest emissions 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) or the spectrum analyzer(*2).

[Note]

(*1) : Spectrum Analyzer Set Up Conditions (below 1 GHz)
Resolution bandwidth : 100 kHz
Video bandwidth : 1 MHz

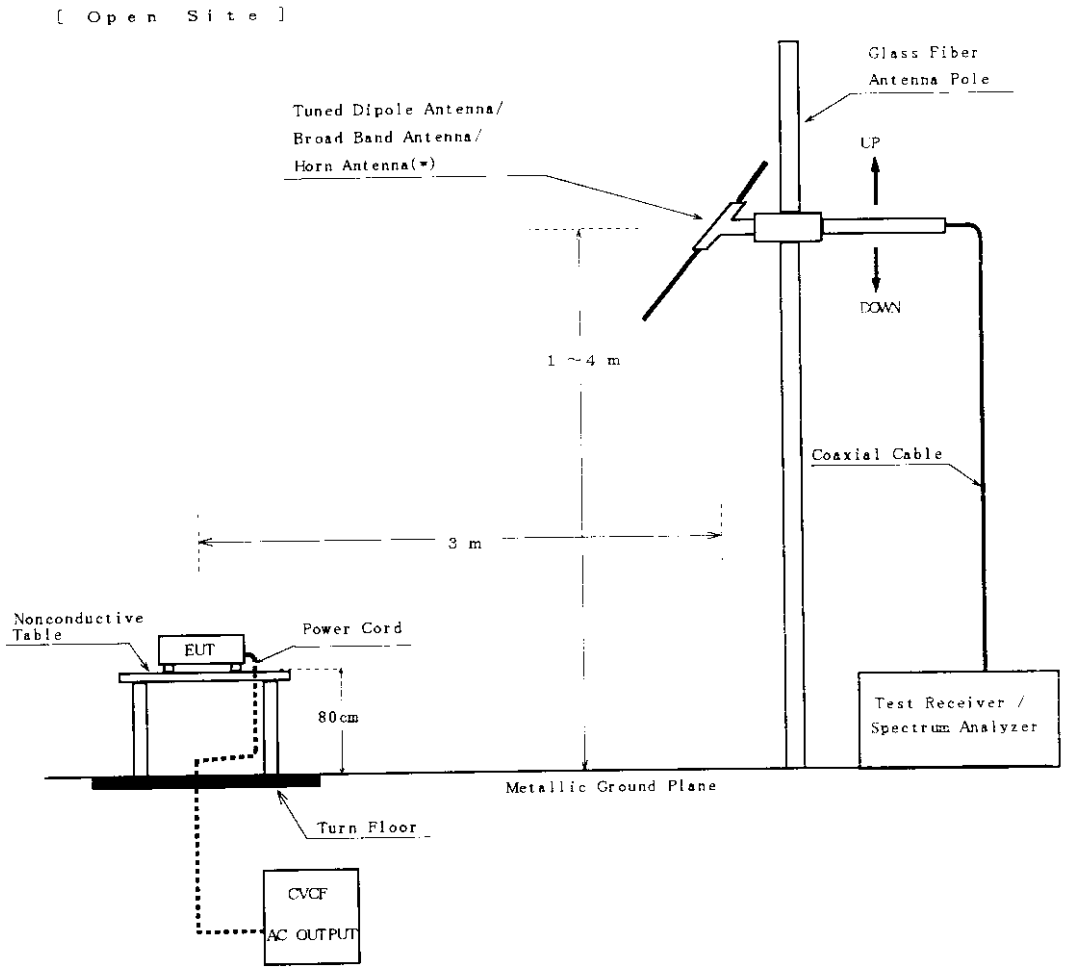
(*2) : Spectrum Analyzer Set Up Conditions (above 1 GHz)
Resolution bandwidth : 1 MHz
Video bandwidth : 1 MHz

(*3) : Test Receiver Set Up Conditions (below 1 GHz)
Detector function : Quasi-Peak
IF bandwidth : 120 kHz

(*4) : Test Receiver Set Up Conditions (above 1 GHz)
Detector function : Average
IF bandwidth : 1 MHz

ENGINEERING TEST REPORT

4.3 Test Configuration



[Note]

(*) : In frequency range above 1 GHz use only.

ENGINEERING TEST REPORT

4.5 Test Results

[ON AIR CHANNEL --- below 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
TV VHF Fundamental						
2	101	11.2	0.5	<5.0	<16.2	43.5
3	107	12.0	0.5	1.5	13.5	43.5
4	113	12.9	1.0	1.0	13.9	43.5
5	123	14.1	<0.0	<0.0	<14.1	43.5
6	129	14.5	<0.0	<0.0	<14.5	43.5
7	221	18.2	0.3	<5.0	<23.2	46.0
8	227	18.3	1.3	<0.0	19.6	46.0
9	233	18.4	1.4	<0.0	19.8	46.0
10	239	18.6	1.5	<0.0	20.1	46.0
11	245	18.7	1.7	<0.0	20.4	46.0
12	251	18.8	1.8	<5.0	<23.8	46.0
13	257	19.2	2.1	<0.0	21.3	46.0
TV VHF 2nd Harmonic						
2	202	17.8	<0.0	<0.0	<17.8	43.5
3	214	18.1	<0.0	<0.0	<18.1	43.5
4	226	18.3	<0.0	<0.0	<18.3	46.0
5	246	18.7	<0.0	<0.0	<18.7	46.0
6	258	19.3	<0.0	<0.0	<19.3	46.0
7	442	20.2	<0.0	<0.0	<20.2	46.0
8	454	20.5	<0.0	<0.0	<20.5	46.0
9	466	20.8	<0.0	<0.0	<20.8	46.0
10	478	21.1	<0.0	<0.0	<21.1	46.0
11	490	21.4	<0.0	<0.0	<21.4	46.0
12	502	21.7	<0.0	<0.0	<21.7	46.0
13	514	22.0	<0.0	<0.0	<22.0	46.0

ENGINEERING TEST REPORT

- Continued -

[ON AIR CHANNEL --- below 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
TV UHF Fundamental						
14	517	22.1	3.0	3.7	25.8	46.0
19	547	22.8	3.9	4.9	27.7	46.0
28	601	24.1	5.2	6.4	30.5	46.0
36	649	24.8	6.6	7.5	32.3	46.0
44	697	25.4	8.5	6.0	33.9	46.0
53	751	25.9	7.9	6.5	33.8	46.0
61	799	26.4	9.1	6.7	35.5	46.0
69	847	26.9	9.2	6.9	36.1	46.0

[ON AIR CHANNEL --- above 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Pre·AMP Gain	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	[dB]	Horiz. [dBμV]	Vert. [dBμV	[dBμV/m]	[dBμV/m]
TV UHF 2nd Harmonic							
14	1034	25.0	37.2	40.0	39.0	27.8	54.0
19	1094	23.6	37.1	46.9	43.9	33.4	54.0
28	1202	24.5	37.0	44.8	42.4	32.3	54.0
36	1298	23.3	36.8	49.6	49.7	36.2	54.0
44	1394	22.5	36.7	53.2	51.4	39.0	54.0
54	1514	23.1	36.5	56.5	55.4	43.1	54.0
61	1598	22.2	36.3	58.0	55.0	43.9	54.0
69	1694	22.6	36.2	58.0	54.7	44.4	54.0

ENGINEERING TEST REPORT

- Continued -

[CATV CHANNEL --- below 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
CATV Fundamental						
1	119	13.7	0.4	<0.0	14.1	43.5
95	137	15.1	<0.0	<0.0	<15.1	43.5
97	149	15.8	2.0	0.1	17.8	43.5
99	161	16.3	2.2	0.1	18.5	43.5
14	167	16.7	2.4	0.6	19.1	43.5
18	191	17.5	2.6	<2.0	20.1	43.5
22	215	18.1	2.0	0.2	20.1	43.5
23	263	19.6	1.1	<0.0	20.7	46.0
29	299	21.8	5.7	1.7	27.5	46.0
36	341	18.5	9.4	5.7	27.9	46.0
37	347	18.6	9.1	6.4	27.7	46.0
65	515	22.0	2.7	3.5	25.5	46.0
94	689	25.3	8.1	6.3	33.4	46.0
100	695	25.4	8.4	6.8	33.8	46.0
113	773	26.1	9.1	6.6	35.2	46.0
125	845	26.9	9.6	7.0	36.5	46.0
CATV 2nd Harmonic						
1	238	18.5	<0.0	<0.0	<18.5	46.0
95	274	20.3	<0.0	<0.0	<20.3	46.0
97	298	21.7	<0.0	<0.0	<21.7	46.0
99	322	18.3	<0.0	<0.0	<18.3	46.0
14	334	18.4	<0.0	<0.0	<18.4	46.0
18	382	19.0	<0.0	<0.0	<19.0	46.0
22	430	19.9	<0.0	<0.0	<19.9	46.0
23	526	22.3	<0.0	<0.0	<22.3	46.0
29	598	24.1	<0.0	<0.0	<24.1	46.0
36	682	25.2	<0.0	<0.0	<25.2	46.0
37	694	25.4	<0.0	<0.0	<25.4	46.0

ENGINEERING TEST REPORT

- Continued -

[CATV CHANNEL --- above 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Pre.AMP Gain	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	[dB]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
CATV 2nd Harmonic							
65	1030	25.1	37.2	39.0	39.5	27.4	54.0
94	1378	22.7	36.7	53.1	52.4	39.1	54.0
100	1390	22.6	36.7	53.8	52.4	39.7	54.0
113	1546	22.7	36.4	59.1	57.5	45.4	54.0
125	1690	22.6	36.2	57.6	56.5	44.0	54.0

[Note]

Antenna factor includes the loss of coaxial cable used for the test.

[Environment]

Temperature : 25 ℃ Humidity : 54 %

[Sample calculation]

Frequency : 1030 [MHz] (CATV 65ch. 2nd Harmonic)
Meter Reading : 39.5 [dBμV] (at Vertical Polarization)
Antenna Factor : 25.1 [dB/m]
Pre-AMP Gain : 37.2 [dB]

Then, Field Strength is calculated as follows.

Field Strength = 39.5 + 25.1 - 37.2 = 27.4 [dBμV/m]

[Summary of Test Results]

Minimum margin was 8.6 dB at 1546 MHz, CATV 113ch (2nd Harmonic) horiz.polarization.

Tested Date : August 13, 1998

Signature H. Matsuyama
Hironobu Matsuyama

ENGINEERING TEST REPORT

5. ANTENNA POWER CONDUCTION MEASUREMENT

5.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.111(a).

5.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.1, the block diagram and the photographs of EUT System configuration in this report.

2) Power cord for the EUT System is connected the receptacle of LISN.

3) Connect the antenna terminal of EUT to the test receiver or the spectrum analyzer by using the matching transformer and the coaxial cable.

4) Warm up the EUT System.

5) Activate the EUT System and run the prepared software for the test, if require.

6) To find out the emissions of the EUT System, preliminary measurement is performed by using the spectrum analyzer(*1).
In the frequency above 1 GHz, it is performed by using the spectrum analyzer(*2).

7) To find out an EUT System condition produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

8) The spectrum are scanned from 30 MHz to 1.7 GHz and collect the highest emissions on the spectrum analyzer relative to the limit.

9) In final compliance test, the local oscillator emissions and the highest emissions recorded above are measured by using the test receiver(*3).
In the frequency above 1 GHz, the measurements are performed by the test receiver(*4) or the spectrum analyzer(*2).

[Note]

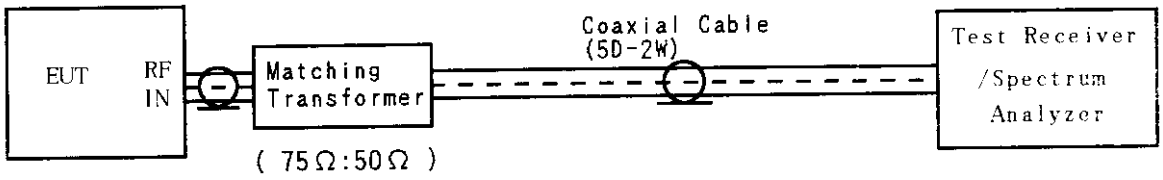
(*1) : Spectrum Analyzer Set Up Conditions (below 1 GHz)
Resolution bandwidth : 100 kHz
Video bandwidth : 1 MHz

(*2) : Spectrum Analyzer Set Up Conditions (above 1 GHz)
Resolution bandwidth : 1 MHz
Video bandwidth : 1 MHz

(*3) : Test Receiver Set Up Conditions (below 1 GHz)
Detector function : Quasi-Peak
IF bandwidth : 120 kHz

(*4) : Test Receiver Set Up Conditions (above 1 GHz)
Detector function : Average
IF bandwidth : 1 MHz

5.3 Test Configuration



ENGINEERING TEST REPORT

5.4 Test Results

[ON AIR CHANNEL]

Measurement Frequency		Correction Factor	Meter Reading	Conversion Factor [dBμV] to [dBnW]	Antenna Power Conduction	Limit*
ch.	[MHz]	[dB]	[dBμV]	[dB]	[dBnW]	[dBnW]
TV VHF Fundamental						
2	101	6.5	<0.0	-48.8	<-42.3	3.0
3	107	6.5	<0.0	-48.8	<-42.3	3.0
4	113	6.5	<0.0	-48.8	<-42.3	3.0
5	123	6.5	<0.0	-48.8	<-42.3	3.0
6	129	6.5	<0.0	-48.8	<-42.3	3.0
7	221	6.5	<0.0	-48.8	<-42.3	3.0
8	227	6.5	0.1	-48.8	-42.2	3.0
9	233	6.5	0.3	-48.8	-42.0	3.0
10	239	6.5	0.1	-48.8	-42.2	3.0
11	245	6.5	0.1	-48.8	-42.2	3.0
12	251	6.5	<0.0	-48.8	<-42.3	3.0
13	257	6.5	<0.0	-48.8	<-42.3	3.0
TV VHF 2nd Harmonic						
2	202	6.5	<0.0	-48.8	<-42.3	3.0
3	214	6.5	<0.0	-48.8	<-42.3	3.0
4	226	6.5	<0.0	-48.8	<-42.3	3.0
5	246	6.5	<0.0	-48.8	<-42.3	3.0
6	258	6.5	<0.0	-48.8	<-42.3	3.0
7	442	6.5	<0.0	-48.8	<-42.3	3.0
8	454	6.5	<0.0	-48.8	<-42.3	3.0
9	466	6.5	<0.0	-48.8	<-42.3	3.0
10	478	6.5	<0.0	-48.8	<-42.3	3.0
11	490	6.5	<0.0	-48.8	<-42.3	3.0
12	502	6.5	<0.0	-48.8	<-42.3	3.0
13	514	6.5	<0.0	-48.8	<-42.3	3.0
TV UHF Fundamental						
14	517	6.5	0.7	-48.8	-41.6	3.0
19	547	6.5	0.8	-48.8	-41.5	3.0
28	601	6.5	0.4	-48.8	-41.9	3.0
36	649	6.5	0.8	-48.8	-41.5	3.0
44	697	6.5	1.4	-48.8	-40.9	3.0
53	751	6.5	3.4	-48.8	-38.9	3.0
61	799	6.5	5.1	-48.8	-37.2	3.0
69	847	6.5	8.4	-48.8	-33.9	3.0
TV UHF 2nd Harmonic						
14	1034	6.8	<10.0	-48.8	<-32.0	3.0
19	1094	6.8	<10.0	-48.8	<-32.0	3.0
28	1202	6.8	14.0	-48.8	-28.0	3.0
36	1298	6.8	15.1	-48.8	-26.9	3.0
44	1394	6.8	16.0	-48.8	-26.0	3.0
53	1502	6.8	<10.0	-48.8	<-32.0	3.0
61	1598	6.9	29.8	-48.8	-12.1	3.0
69	1694	6.8	29.9	-48.8	-12.1	3.0

[Note] *) 3.0[dBnW] in Limit is equal to 2[nW].

ENGINEERING TEST REPORT

- Continued -

[CATV CHANNEL]

Measurement Frequency		Correction Factor	Meter Reading	Conversion Factor [dBμV] to [dBnW]	Antenna Power Conduction	Limit*
ch.	[MHz]	[dB]	[dBμV]	[dB]	[dBnW]	[dBnW]
CATV Fundamental						
1	119	6.5	<0.0	-48.8	<-42.3	3.0
95	137	6.5	<0.0	-48.8	<-42.3	3.0
97	149	6.5	<0.0	-48.8	<-42.3	3.0
99	161	6.5	<0.0	-48.8	<-42.3	3.0
14	167	6.5	<0.0	-48.8	<-42.3	3.0
18	191	6.5	<0.0	-48.8	<-42.3	3.0
22	215	6.5	<0.0	-48.8	<-42.3	3.0
23	263	6.5	<0.0	-48.8	<-42.3	3.0
29	299	6.5	<0.0	-48.8	<-42.3	3.0
36	341	6.5	<0.0	-48.8	<-42.3	3.0
37	347	6.5	<0.0	-48.8	<-42.3	3.0
65	515	6.5	0.3	-48.8	-42.0	3.0
94	689	6.5	1.3	-48.8	-41.0	3.0
100	695	6.5	1.5	-48.8	-40.8	3.0
113	773	6.6	3.4	-48.8	-38.8	3.0
125	845	6.6	5.9	-48.8	-36.3	3.0
CATV 2nd Harmonic						
1	238	6.5	<0.0	-48.8	<-42.3	3.0
95	274	6.5	<0.0	-48.8	<-42.3	3.0
97	298	6.5	<0.0	-48.8	<-42.3	3.0
99	322	6.5	<0.0	-48.8	<-42.3	3.0
14	334	6.5	<0.0	-48.8	<-42.3	3.0
18	382	6.5	<0.0	-48.8	<-42.3	3.0
22	430	6.5	<0.0	-48.8	<-42.3	3.0
23	526	6.5	<0.0	-48.8	<-42.3	3.0
29	598	6.5	<0.0	-48.8	<-42.3	3.0
36	682	6.5	<0.0	-48.8	<-42.3	3.0
37	694	6.5	<0.0	-48.8	<-42.3	3.0
65	1030	6.8	<10.0	-48.8	<-32.0	3.0
94	1378	6.8	13.7	-48.8	-28.3	3.0
100	1390	6.8	13.7	-48.8	-28.3	3.0
113	1546	6.8	19.3	-48.8	-22.7	3.0
125	1690	6.8	16.5	-48.8	-25.5	3.0

[Note] *) 3.0[dBnW] in Limit is equal to 2[nW].

ENGINEERING TEST REPORT

- Continued -

[Environment]

Temperature : 27 ℃ Humidity : 60 %

[Note]

The correction factor consist of the voltage loss of the impedance matching transformer (50Ω : 75Ω) and the coaxial cable used for the test.

[Sample calculation]

Frequency	:	227	[MHz] (VHF 8ch Fundamental)
Meter Reading	:	0.1	[dBμV]
Correction Factor	:	6.5	[dB]
Conversion Factor	:	-48.8	[dB] (dBμV to dBnW)

Then, the antenna Power Conduction is calculated as follows.

Antenna Power Conduction = 0.1 + 6.5 - 48.8 = -42.2 [dBnW]

[Summary of Test Results]

Minimum margin was 15.1 dB at 1598 MHz(UHF #61ch) and 1694 MHz(UHF #69ch) at 2nd harmonic.

Tested Date : August 21, 1998 Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

6. PICTURE SENSITVITY MEASUREMENT

6.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.117(f).

6.2 Test Procedure

1) Configurate the EUT system in accordance with IEEE Std 190, and 6.3 Test Configuration in this report.

2) Active and warm up the EUT system.

3) Connect the antenna terminal of EUT to the standard signal generator by using the matching transformer and coaxial cable, and connect the video out terminal of EUT to the band pass filter(*1) and oscilloscope(*2) by using the coaxial cables.

4) The frequency of the standard signal generator(*3) is adjusted the tuned frequency of EUT.

5) The frequency and output level of standard signal generator are adjusted, until the specified video output level of EUT system is appeared on the oscilloscope.

6) The measurement are performed at US VHF channel 2,6,7 and 13, and US UHF channel 14, 44 and 69.

[Note]

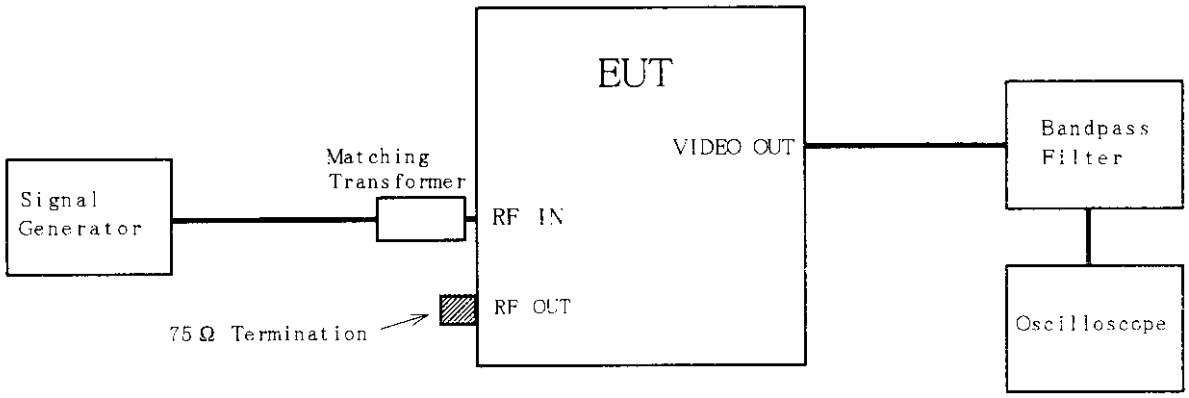
(*1) Band pass filter set up conditions
Start Frequency : 600 Hz
Stop Frequency : 2000 Hz

(*2) Oscilloscope set up conditions
Sweep Time : 0.1 msec.
Volt/Div. : 0.5 V

(*3) Standard signal generator set up conditions
Modulation : Amplitude modulation
Modulating Frequency : 1000 Hz
Percent modulation : 30%

ENGINEERING TEST REPORT

6.3 Test Configuration



6.4 Test Results

VHF Measurement Frequency		Antenna Input Level		UHF Measurement Frequency		Antenna Input Level	
ch.	[MHz]	[dBm]	[pW]	ch.	[MHz]	[dBm]	[pW]
2	55.25	-90.5	0.891	14	471.25	-88.7	1.349
6	83.25	-91.5	0.708	44	651.25	-88.8	1.318
7	175.25	-90.6	0.871	69	801.25	-87.0	1.995
13	211.25	-90.8	0.832				
AVERAGE "VHF"			0.826	AVERAGE "UHF"			1.554

AVERAGE UHF/VHF : $10 \log \frac{\text{"UHF" pW}}{\text{"VHF" pW}} = 2.7$ dB

[Limit 8.0 dB]

[Environment]
Temperature : 25 ℃ Humidity : 54 %

[Summary of Test Results]
Margin was 5.3 dB.

Tested Date : August 31, 1998 Signature

Ikuya Minematsu

ENGINEERING TEST REPORT

7.NOISE FIGURE MEASUREMENT

7.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.117(g).

7.2 Test Procedure

1) Configurate the EUT system in accordance with FCC/OET MP-2, and 7.3 Test Configuration in this report.

2) Active and warm up the EUT system.

3) Connect the antenna input terminal of EUT to the correct terminating impedance.

4) Measurement of AGC voltage of EUT are made at the measurement channels.

5) Connect the antenna input terminal of EUT to the Noise Source of the Noise Figure Indicator(*1) by using the matching transformer, the noise source and coaxial cable. Connect the intermediate frequency terminal on the tuner pack of EUT to the IF INPUT terminal of the Noise Figure Indicator by using the coaxial cable.

6) In final compliance test, the measurement are performed at all US UHF channel by using the noise figure indicator.

7) If ΔF(Noise Figure contribution of the amplifier following the measurement point in dB) exceed 0.3 dB, the measured noise figure is corrected by ΔF. ΔF is calculated the tuner gain(gain of circuit from receiver antenna input terminal to measurement point as a power), the noise figure from receiver antenna input terminal to measurement point as power ratio and the noise figure of that IF amplifier as power radio, therefore the tuner gain shall be measured.

8) For the measurement of the tuner gain, Connect the intermediate frequency terminal on the tuner pack of EUT to the spectrum analyzer(*2) by using the high impedance probe and connect the antenna input terminal of EUT to the standard signal generator by using the matching transformer and the coaxial cable.

9) The frequency of the standard signal generator is adjusted the tuned frequency of EUT.

10) Then, tuner gain is calculated as that the ratio of the output level of intermediate frequency amplifier on the tuner pack of EUT appeared on the spectrum analyzer minus the output level of the standard signal generator and ΔF is calculated.

[Note]

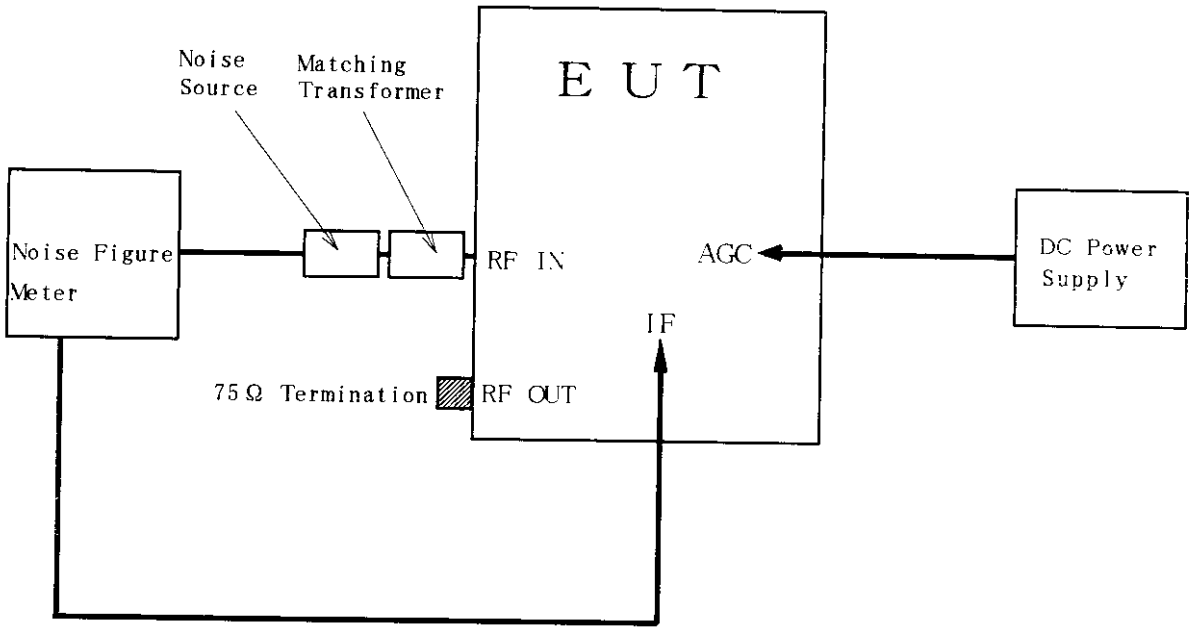
(*1) Noise Figure Indicator set up conditions
Frequency Select : 43.5 MHz

(*2) Spectrum analyzer set up conditions

RBW	:	30 kHz
VBW	:	30 kHz
ATT	:	10 dB
Span	:	10 MHz

ENGINEERING TEST REPORT

7.3 Test Configuration



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7.4 Test Results

Measurement Frequency		Correction Factor	Meter Reading	Tuner Gain	△F	Noise Figure	Limit
ch.	[MHz]	[dB]	[dBμV]	[dB]	[dB]	[dB]	[dB]
TV UHF							
14	471.25	0.8	6.2	45.6	0.040	5.4	14
20	507.25	0.8	6.1	45.8	0.040	5.3	14
26	543.25	0.8	6.1	45.9	0.039	5.3	14
32	579.25	0.9	6.2	46.0	0.039	5.3	14
38	615.25	0.9	6.4	45.9	0.038	5.5	14
44	651.25	0.9	6.5	46.1	0.036	5.6	14
50	687.25	1.0	6.4	46.2	0.037	5.4	14
56	723.25	1.0	6.3	45.8	0.040	5.3	14
62	759.25	1.1	7.1	45.6	0.035	6.0	14
69	801.25	1.1	7.9	44.4	0.033	6.8	14
Maximum "NF" Channel(69)		1.1	7.9	44.4	0.033	6.8	14

[Note]

(x)The second stage(IF Amp) noise figure contribution did not exceed 0.3dB.
(x)4dB is subtracted from the measured noise figure, because a power splitter is equiped in VCR.

The noise figure contribution of IF amplifier following the measurement point:

$$\triangle F = 10\ \mathrm{Log}_{10}\left\{1+\frac{F_2-1}{F_1\times G_1}\right\}$$

where, △F: Noise figure contribution of the amplifier following the measurement point in dB.
F_1: Noise figure from receiver antenna input terminal to measurement point as power ratio.
F_2: Noise figure of that IF amplifier as power ratio.
G_1: Gain of circuit from receiver antenna input terminals to measurement point as a power gain.

[Environment]

Temperature : 25 ℃ Humidity : 54 %

[Summary of Test Results]

Minimum margin was 7.2 dB at 801.25 MHz, 69ch.

Tested Date : August 31, 1998 Signature

Ikuya Minematsu

ENGINEERING TEST REPORT

8. LIST OF TEST INSTRUMENTS

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
Test Receiver	Kyoritsu	KNM-2403	Frequency Range 9 kHz - 30 MHz	FS-70	3	1998/4	1998/4
	Rohde & Schwarz	ESVS10	Frequency Range 20 MHz - 1 GHz	FS-82	4,5	1998/2	1999/2
Spectrum Analyzer	Advantest	TR4172	Frequency Range 50 Hz - 1.8 GHz	SA-23	3,5,7	1998/1	1999/1
		R3261C	Frequency Range 9 kHz - 2.6 GHz	SA-41	4	1998/8	1999/8
Pre-Amplifier	Hewlett Packard	8449B	Frequency Range 1 GHz - 26.5 GHz	AM-52	4	1998/4	1999/4
Line Impedance Stabiliza-tion Network	Kyoritsu	KNW-407	Frequency Range 150 kHz - 30 MHz Impedance 50 Ω / 50 μH Capacity AC 250 V, 15 A	FL-72	3	1998/4	1999/4
Biconical Antenna	Schwarzbeck	BBA9106	Frequency Range 30 MHz - 300 MHz	AN-94	4	1998/2	1999/2
Log-Periodic Antenna	Schwarzbeck	UHALP 9108A	Frequency Range 300 MHz - 1 GHz	AN-217	4	1998/2	1999/2
Tuned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25 MHz - 500 MHz	AN-135	—	1998/2	1999/2
		KBA-611S	Frequency Range 500 MHz - 1 GHz	AN-137	—	1998/2	1999/2
Horn Antenna	RAVEN	91888-2	Frequency Range 1 GHz - 2 GHz	AN-167	4	1997/11	1999/11

ENGINEERING TEST REPORT

- Continued -

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
IRE TV Signal Generator	Sibasoku	VG40A	NTSC US 4ch, 13ch	MG-43	3	1997/12	1998/12
20dB PAD	Made by KEC		Attenuation 20 dB	MM-39-4	3	—	—
Impedance Trans-former	NMC	MB-009	Frequency Range 10 MHz - 2 GHz 50 Ω : 75 Ω	AX-27	5	1997/11	1998/11
Oscillo-scope	Matsushita	VP-5530B	Frequency Range DC - 300 MHz	OS-18	6	1998/5	1999/5
Filter	Krohn-Hite	3550	Frequency Range 2 Hz - 200 kHz	FL-32	6	1998/3	1999/3
Matching Trans-former	Anritsu	MP614A	Frequency Range 10 MHz - 1.2 GHz 50 Ω : 75 Ω	AX-28-3	6,7	1997/11	1998/11
Standard Signal Generator	Anritsu	MG3601A	Frequency Range 100 kHz - 1.04 GHz	SG-48	6,7	1997/9	1998/9
Noise Figure Meter	Elena	ENF-2005	Frequency Range 10.7MHz - 56.5MHz Noise Source 28 Vp-p	MM-30	7	1998/6	1999/6
Noise Source	Microwave Semiconduc-tor	MC1100	Frequency Range 50 MHz - 1 GHz Noise Ration 15 dB - 16 dB	MM-30-2	7	1998/6	1999/6

Designated by Ministry of International Trade and Industry

KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE
6-8-7, NISHITEMMA
KITA-KU, OSAKA, 530 JAPAN

KEC

IKOMA
TESTING LABORATORY
10630, TAKAYAMA-CHO
IKOMA-CITY, NARA, 630-01 JAPAN

Corporate Juridical Person

ENGINEERING TEST REPORT

REPORT NO. A-024-98-C Issued Date : September 9, 1998

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.

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 : BFYVRJ6A1NAT
Device Name : Video Cassette Recorder
Trade Name : TOSHIBA
Model Number : M-625
Serial Number : WS-0002 ☒ Prototype ☐ Pre-production ☐ Production
Date of Manufacture : July, 1998

3. Test Items and Procedure

☒ AC Power Line Conducted Emission Measurement
☒ Radiated Emission Measurement
☒ Output Signal Level Measurement
☒ Output Terminal Conducted Spurious Emission Measurement
☒ Transfer Switch Measurement

Above all tests were performed under : ANSI C63.4-1992

4. Date

Receipt of Test Sample : July 29, 1998
Test Completed on : September 1, 1998

CERTIFIED BY : S. Izumi

Seiichi Izumi
Manager of Ikoma Testing Laboratory

ENGINEERING TEST REPORT

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1. GENERAL INFORMATION

1.1 Product Description

The TOSHIBA Model No.M-625 (referred to as the EUT in this report) is a Video Cassette Recorder containing RF modulator and Tuner.

1) Provided Terminals
   (1) RF Input Terminal
   (2) RF Output Terminal
   (3) A/V Input Terminals
   (4) A/V Output Terminals

2) RF Modulator Frequency : US CH. #3 Visual Carrier 61.25 MHz,
   Aural Carrier 65.75 MHz
   US CH. #4 Visual Carrier 67.25 MHz,
   Aural Carrier 71.75 MHz

3) Type of RF Output Connector : Type "F" Connector 75Ω (Unbalanced)

4) Used Oscillating Frequency except Local Oscillator
   16 MHz : CPU
   3.579545 MHz : YCA
   32 kHz : Real Time Clock

5) Rated Power Supply : AC 120 V, 60 Hz

1.2 Description for Equipment Authorization

1) Rules Part(s) under which Equipment operated

FCC Rule Part 15, Subpart B : TV Interface Device in Unintentional Radiators.

2) Kind of Equipment Authorization

(X) Certification ( ) Verification

3) Procedure of Application

( ) Original Equipment (X) Modification

1.3 Test Facility

All tests described in this report were performed by:

N a m e : KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC)
IKOMA TESTING LABORATORY
Open Test Site No.4
Shielded Room No.4

Address : 10630, 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 laboratory has 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 Internaitonal, UK), TUV Product Service(GER) and TUV Rheinland(GER) based on their criteria for testing laboratory (EN45001).

ENGINEERING TEST REPORT

2. TESTED SYSTEM

2.1 Test Mode

In each measurement (excluding antenna transfer switch measurement), the compliance tests were performed under following five EUT operation modes.
In transfer switch measurement, it was done under three modes (①~③).

① Playback mode
Playback the video tape that is recorded 1V peak-to-peak VITS signal.

② Record mode (1V VITS Signal Input)
1V peak-to-peak VITS signal is supplied through the VIDEO IN 1(rear side) terminal.

③ Record mode (5V VITS Signal Input)
5V peak-to-peak VITS signal is supplied through the VIDEO IN 1(rear side) terminal.

④ Record mode (0 dBmV NTSC TV Signal Input)
NTSC TV U.S. channel 13 video and audio signal is supplied through the ANTENNA IN terminal.

[Note]
Video Signal (0 dBmV at 211.25 MHz) is modulated by 1V peak-to-peak VITS signal.
Audio Signal (-10 dBmV at 215.75 MHz) is not modulated.

⑤ Record mode (25 dBmV NTSC TV Signal Input)
NTSC TV U.S. channel 13 video and audio signal is supplied through the ANTENNA IN terminal.

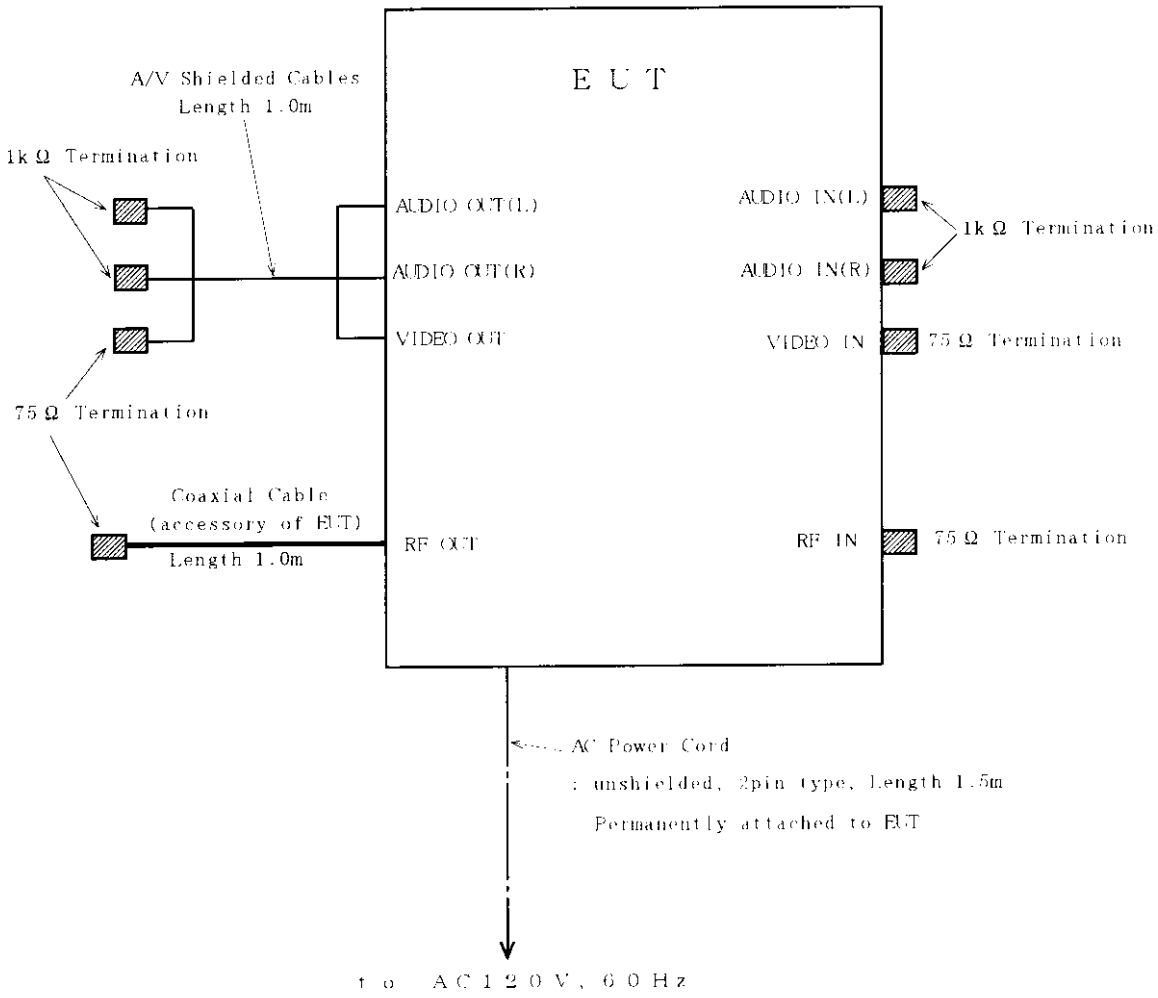
[Note]
Video Signal (25 dBmV at 211.25 MHz) is modulated by 1V peak-to-peak VITS signal.
Audio Signal (15 dBmV at 215.75 MHz) is not modulated.

In each mode, the spectrum was checked and the data of the maximum EUT operation was reported.

ENGINEERING TEST REPORT

2.2 Block Diagram of EUT System
for Conducted and Radiated Emission Measurements

① Playback mode



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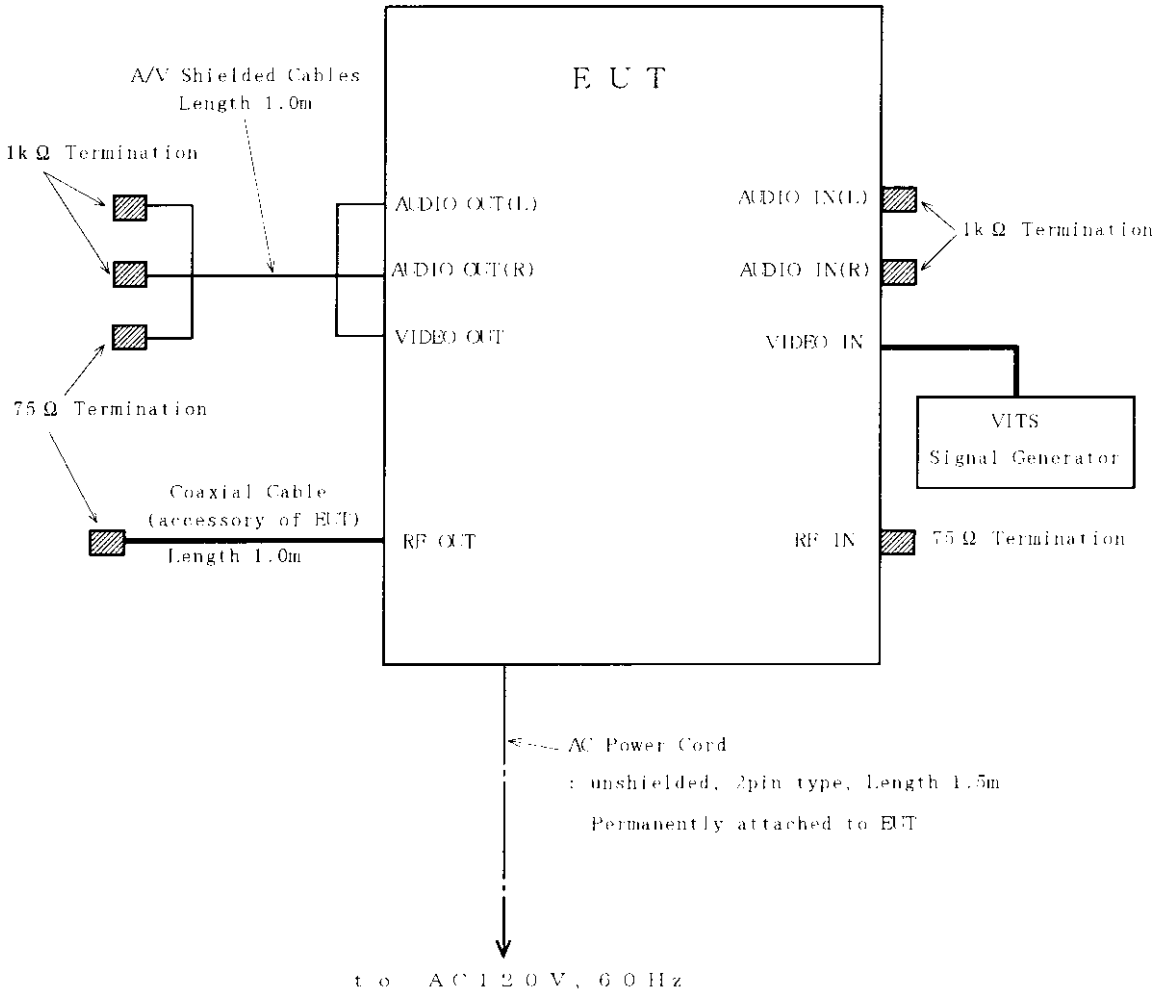
- Continued -

② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)



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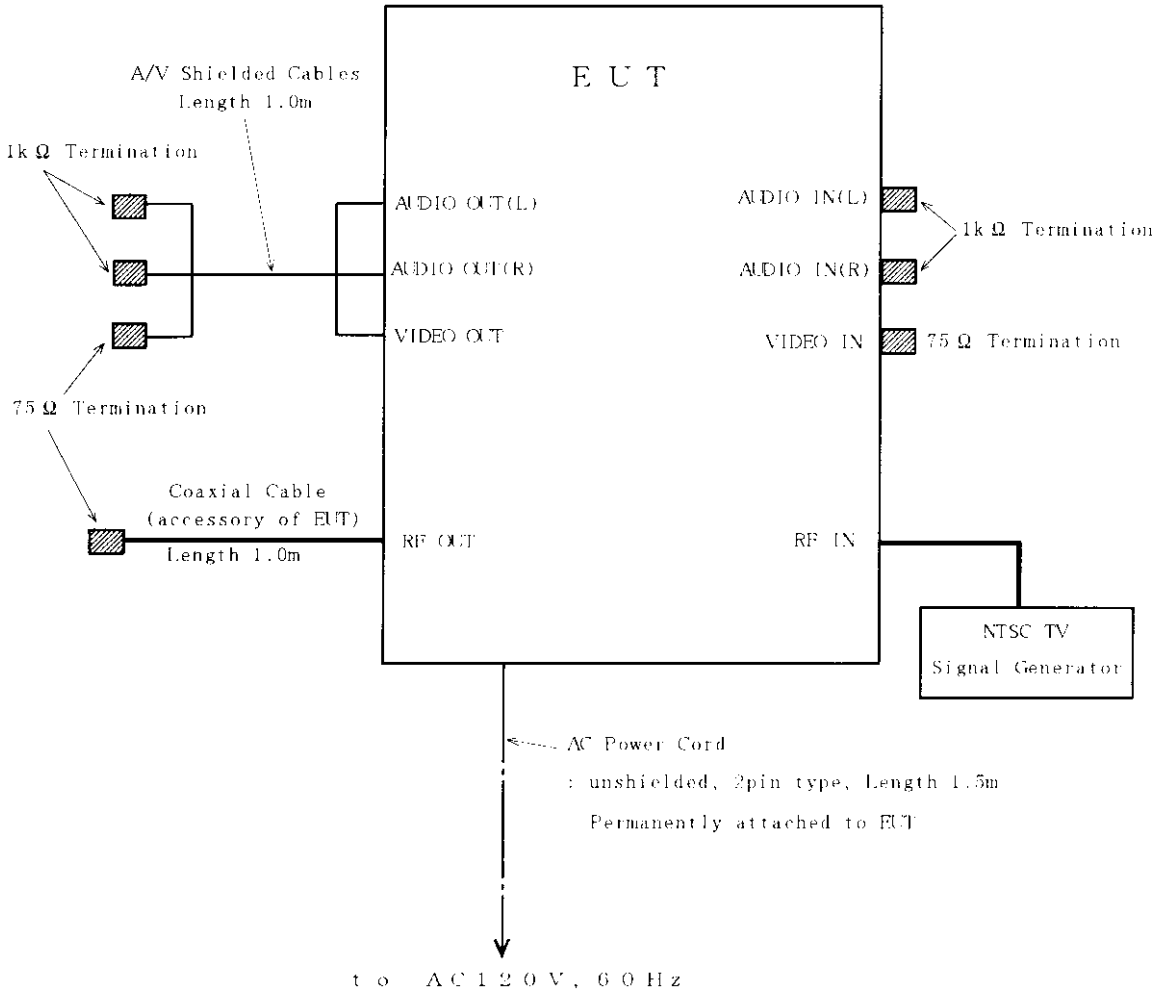
- Continued -

④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)



ENGINEERING TEST REPORT

3. AC POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.107(a).

3.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 7. 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 equipment power cord are 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 require.

6) Using a calibrated coaxial cable, connect the spectrum analyzer(*1) to the mesuring port of the LISN for the EUT.

7) To find out an EUT System condition produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

8) The spectrum are scanned from 450 kHz to 30 MHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

9) The test receiver(*2) is connected to the LISN for the EUT, and the minimum six highest emissions 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

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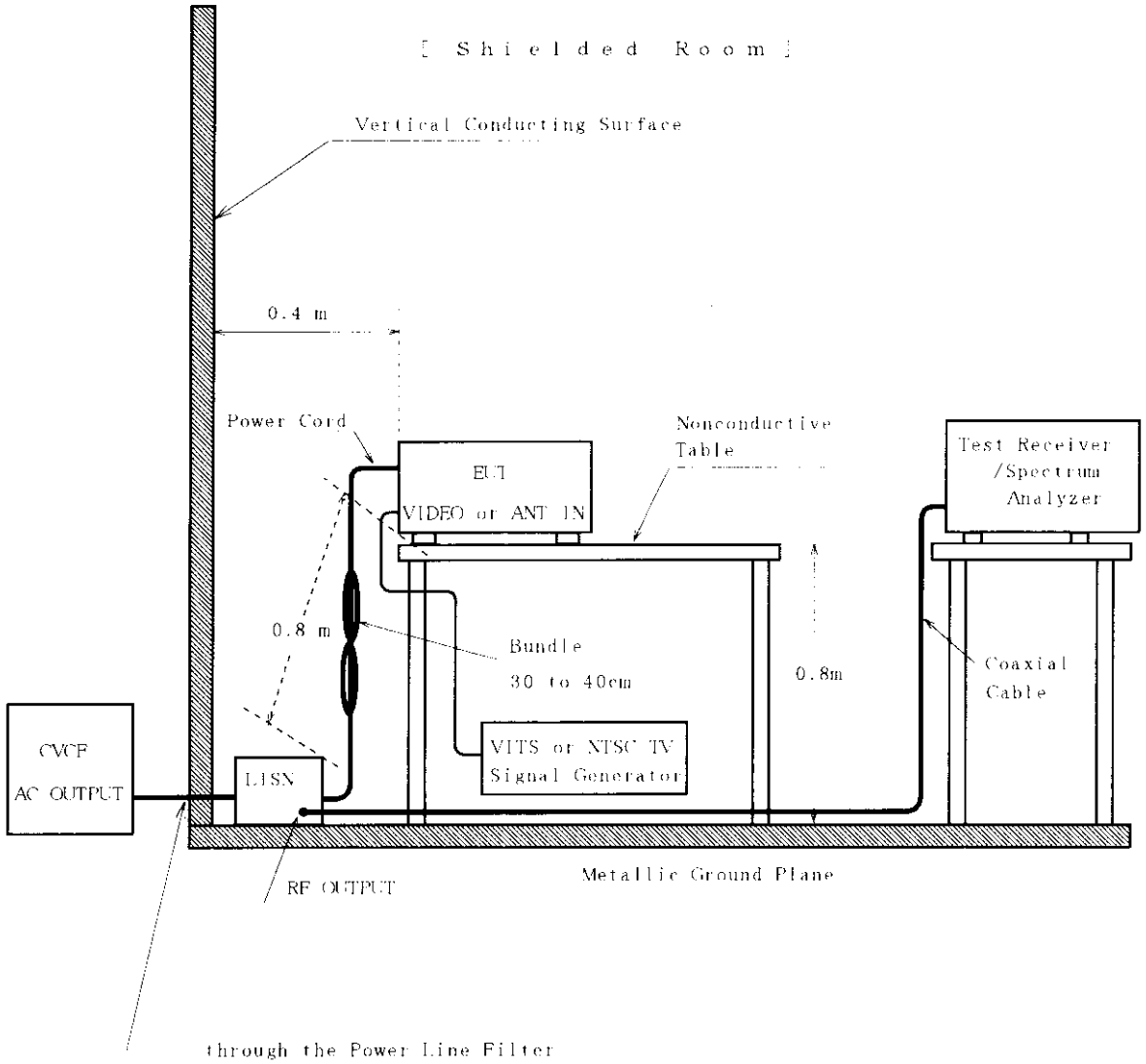
3.3 Test Configuration



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3.5 Test Results

Emission Frequency [MHz]	LISN Corr. Factor [dB]	Meter Reading: One-end to Ground [dBμV]	Meter Reading: Other-end to Ground [dBμV]	Maximum R F Voltage [dBμV]	Limit [dBμV]	Maximum E U T Operation (*)
Test Channel #3						
0.4500	0.1	25.0	23.4	25.1	48.0	④⑤
2.433	0.1	20.7	21.2	21.3	48.0	①
16.00	0.7	33.5	33.3	34.2	48.0	④⑤
21.36	1.0	34.6	34.5	35.6	48.0	④⑤
24.06	1.1	37.4	37.5	38.6	48.0	②③
29.99	1.3	36.7	37.1	38.4	48.0	①

[Environment]

Temperature : 23 ℃ Humidity : 69 %

[Note]

1) LISN Correction Factor includes the cable loss.

2) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

3) The emissions at channel #3 were nearly equal to channel #4.

[Sample calculation]

Frequency : 0.4500 [MHz]
Meter Reading : 25.0 [dBμV] (at One-end to Ground)
LISN Corr. Factor : 0.1 [dB]

Then, RF voltage is calculated as follows.

RF Voltage = 25.0 + 0.1 = 25.1 [dBμV]

[Summary of Test Results]

Minimum margin was 9.4 dB at 24.06 MHz, other-end to ground.

Tested Date : September 1, 1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

4. RADIATED EMISSION MEASUREMENT

4.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.109(a),(c) and 15.115(a).

4.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 8. 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 turn floor.

3) Warm up the EUT System.

4) Activate the EUT System and run the prepared software for the test, if require.

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.

6) To find out an EUT System condition produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

7) The spectrum are scanned from 30 MHz to 1 GHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

8) In final compliance test, the minimum six highest emissions recorded above are measured at the specified distance using the broad band antenna or the tuned dipole antenna and the test receiver(*2).

[Note]

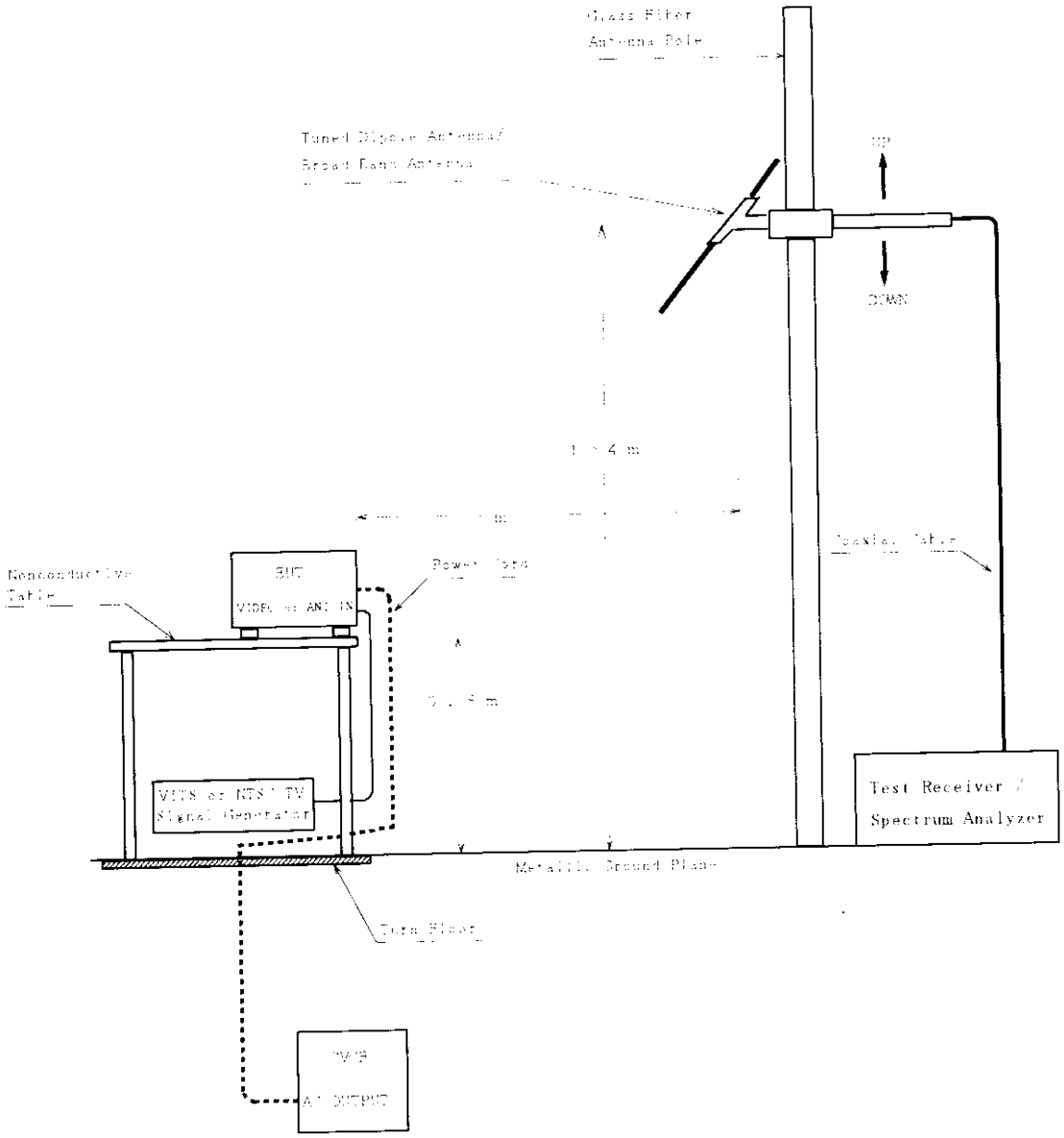
(*1) : Spectrum Analyzer Set Up Conditions
- Frequency range : 30 - 1000 MHz
- Resolution bandwidth : 100 kHz
- Detector function : Peak mode

(*2) : Test Receiver Set Up Conditions
- Detector function : Quasi-Peak
- IF bandwidth : 120 kHz

ENGINEERING TEST REPORT

4.3 Test Configuration

[Open Site]



ENGINEERING TEST REPORT

4.5 Test Results

[Distance : 3 m]

Emission Frequency [MHz]	Antenna Factor [dB]	Meter Reading Horizontal Polarization [dBμV]	Meter Reading Vertical Polarization [dBμV]	Maximum Field Strength [dBμV/m]	Limits [dBμV/m]	Maximum E U T Operation (*)
Test Channel #3						
61.25	9.1	<0.0	<3.0	<12.1	40.0	①~⑤
65.75	8.5	<3.0	<3.0	<11.5	40.0	①~⑤
122.50	15.1	<0.0	<0.0	<15.1	43.5	①~⑤
245.00	20.2	<0.0	<0.0	<20.2	46.0	①~⑤
Test Channel #4						
67.25	8.4	10.5	8.6	18.9	40.0	①
71.75	8.0	<3.0	<3.0	<11.0	40.0	①~⑤
134.50	16.2	<0.0	<0.0	<16.2	43.5	①~⑤
201.75	18.9	<0.0	<0.0	<18.9	43.5	①~⑤
Other emissions						
31.12	18.3	4.2	15.8	34.1	40.0	②③
39.19	15.3	0.1	15.3	30.6	40.0	②③
49.00	11.8	<0.0	12.0	23.8	40.0	③
80.00	7.9	23.4	14.3	31.3	40.0	②③
114.55	14.2	9.0	10.2	24.4	43.5	④⑤
128.87	15.6	10.6	8.7	26.2	43.5	③
168.00	17.9	10.7	4.1	28.6	43.5	④⑤
200.45	18.9	15.0	6.6	33.9	43.5	②③
229.09	19.7	13.6	8.5	33.3	46.0	④⑤
315.01	17.2	16.2	11.9	33.4	46.0	③
357.97	18.3	17.0	8.9	35.3	46.0	①
386.60	19.0	20.0	14.4	39.0	46.0	①
415.26	19.6	19.5	16.7	39.1	46.0	①

ENGINEERING TEST REPORT

- Continued -

[Environment]

Temperature : 25 ℃ Humidity : 61 %

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

2) Antenna factor includes the cable loss.

[Sample calculation]

Frequency : 31.12 [MHz] (Other emission)
Meter Reading : 15.8 [dBμV] (at Vertical Polarization)
Antenna Factor : 18.3 [dB]

Then, Field Strength is calculated as follows.

Field Strength = 15.8 + 18.3 = 34.1 [dBμV/m]

[Summary of Test Results]

Minimum margin was 5.9 dB at 31.12 MHz, other emissions : vertical polarization.

Tested Date : August 31, 1998 Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

5. OUTPUT SIGNAL LEVEL MEASUREMENT

5.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.115(b)(1)(ii).

5.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.2.

2) Unused RF input/output terminals are terminated in the proper impedance.

3) Activate the EUT system.

4) Set the spectrum analyzer as follows.

Frequency Span	: 1 MHz
Resolution bandwidth	: 100 kHz
Video bandwidth	: 3 MHz
Detector function	: Peak mode

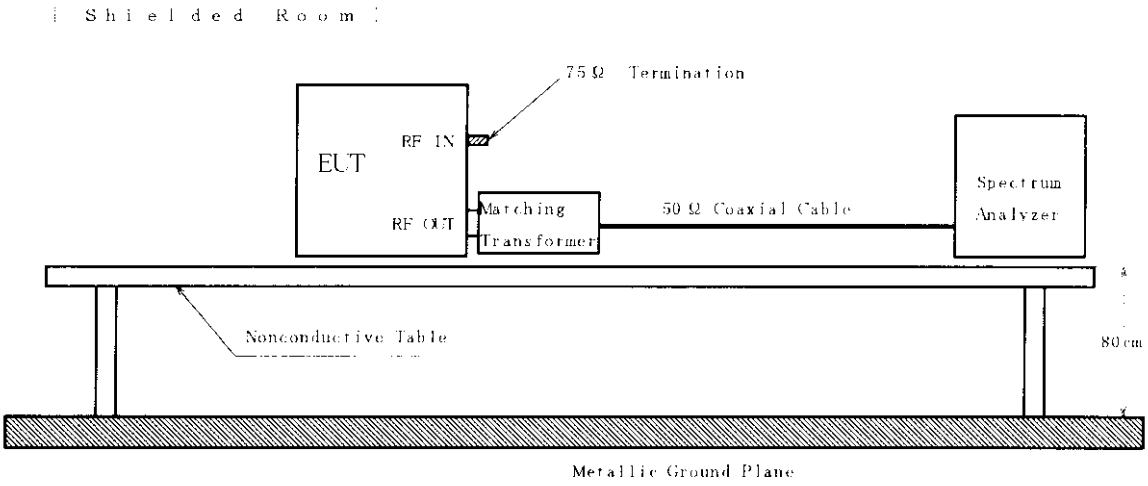
5) The RF output terminal is connected to the spectrum analyzer through the matching transformer with a calibrated 50 ohms coaxial cable.

6) Then, the RF output signal level is measured under the EUT condition produced the maximum signal level.

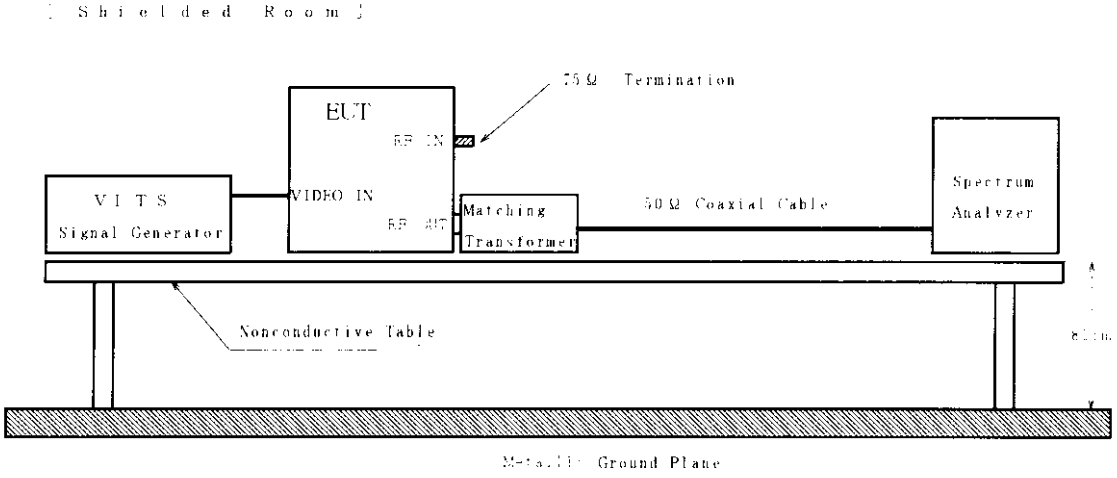
ENGINEERING TEST REPORT

5.3 Test Configuration

① Playback mode



② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)

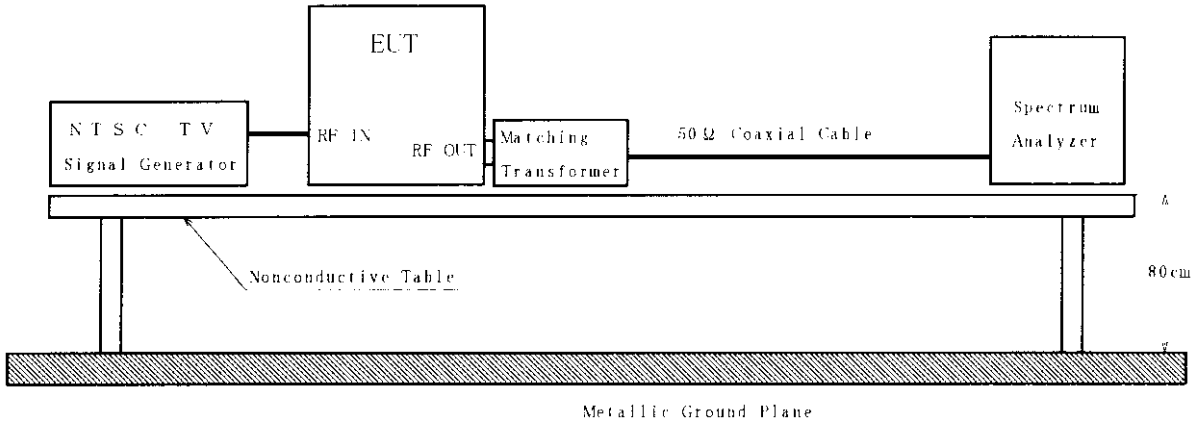


ENGINEERING TEST REPORT

- Continued -

④ Record mode (0dBmV NTSC TV Signal Input)
⑤ Record mode (25dBmV NTSC TV Signal Input)

[Shielded Room]



ENGINEERING TEST REPORT

5.5 Test Results

Emission Frequency [MHz]	Corr. Factor [dB]	Meter Reading [dBμV/50Ω]	Maximum Signal Level [dBμV/75Ω]	Limits [dBμV/75Ω]	Maximum EUT Operation (*)
Test Channel #3					
61.25	2.3	65.4	67.7	69.5	④⑤
65.75	2.3	49.4	51.7	56.5	③
Test Channel #4					
67.25	2.3	65.6	67.9	69.5	①~⑤
71.75	2.3	49.2	51.5	56.5	③~⑤

[Environment]

Temperature : 23℃ Humidity : 69%

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

2) The correction factor consist of the voltage loss of the impedance matching transformer and the coaxial cable used for the test.

[Sample calculation]

Frequency : 61.25 [MHz] (Test Channel #3)
Meter Reading : 65.4 [dBμV/50Ω]
Correction Factor : 2.3 [dB]

Then, the output signal level is calculated as follows.

Signal Level = 65.4 + 2.3 = 67.7 [dBμV/75Ω]

[Summary of Test Results]

Minimum margin was 1.6 dB at 67.25 MHz, test channel #4.

Tested Date : September 1, 1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

6. OUTPUT TERMINAL CONDUCTED SPURIOUS EMISSION MEASUREMENT

6.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.115(b)(2)(ii).

6.2 Test Procedure

1) The EUT system and measuring instrument are set up in the same manner of the output signal measurement.

2) Unused RF input/output terminals are terminated in the proper impedance.

3) Activate the EUT system.

4) The spectrum was scanned from 30 MHz to more than 4.6 MHz below the visual carrier frequency, and from more than 7.4 MHz above the visual carrier frequency to 1000 MHz, and the three highest emissions are selected under the EUT condition produced the maximum signal level at each frequency range.

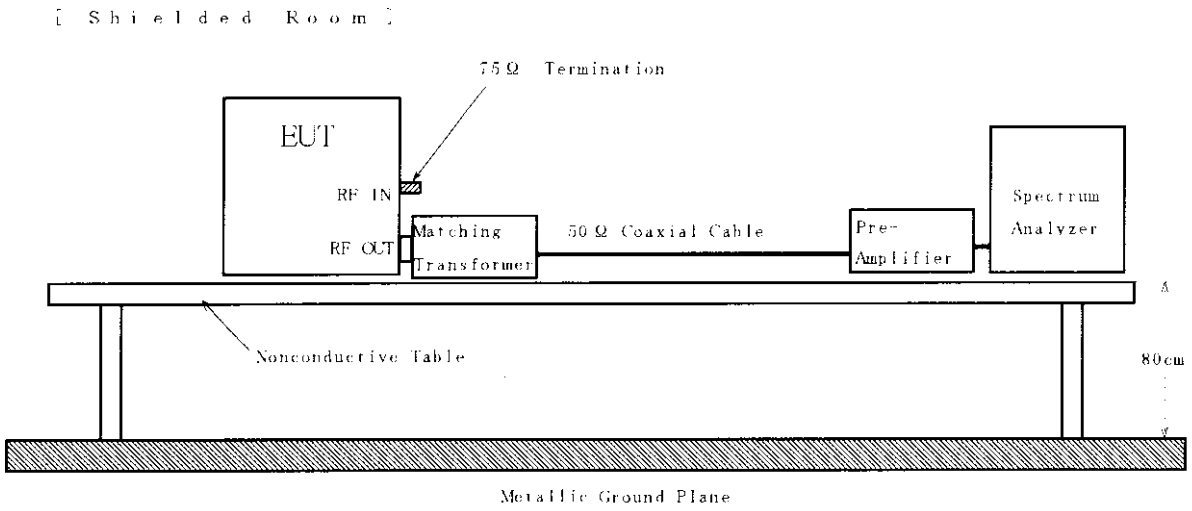
5) The selected emissions are measured.
The spectrum analyzer is set as follow.

Frequency span	: 1 MHz
Resolution bandwidth	: 100 kHz
Video bandwidth	: 3 MHz
Detector function	: Peak mode

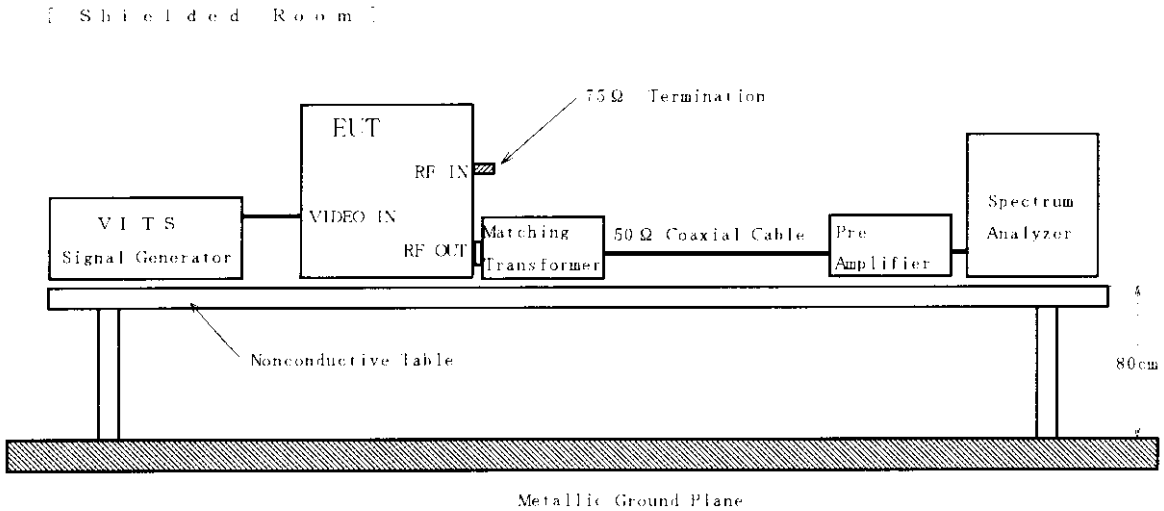
ENGINEERING TEST REPORT

6.3 Test Configuration

① Playback mode



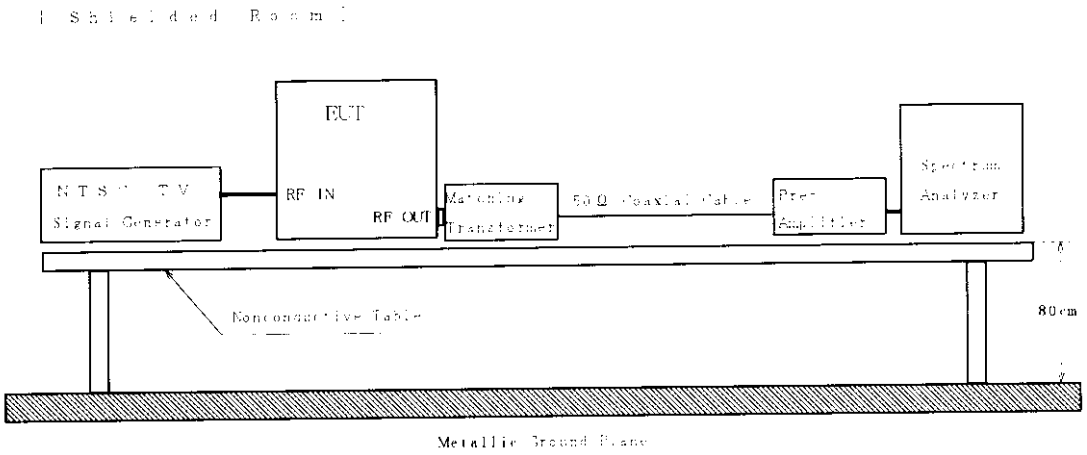
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)



ENGINEERING TEST REPORT

- Continued -

④ Record mode (0dBmV NTSC TV Signal Input)
⑤ Record mode (25dBmV NTSC TV Signal Input)



6.4 Photographs of EUT System Configuration

The tested device configuration is the same as the output signal level measurement.
(See 5.4 Photographs of EUT System Configuration.)

ENGINEERING TEST REPORT

6.5 Test Results

Emission Frequency [MHz]	Corr. Factor [dB]	Meter Reading [dBμV/50Ω]	Maximum Signal Level [dBμV/75Ω]	Limit [dBμV/75Ω]	Maximum EUT. Operation (*)
Test Channel #3					
47.85	2.3	16.2	18.5	39.5	③
55.96	2.3	32.6	34.9	39.5	③
56.65	2.3	33.2	35.5	39.5	③
70.28	2.3	22.9	25.2	39.5	③
122.69	2.3	16.5	18.8	39.5	②
184.02	2.3	23.4	25.7	39.5	①
** 56.65	2.3	20.5	22.8	39.5	③
Test Channel #4					
53.72	2.3	16.4	18.7	39.5	③
61.81	2.3	31.7	34.0	39.5	①③④
62.65	2.3	46.4	48.7	39.5	①
76.13	2.3	24.0	26.3	39.5	③
134.40	2.3	20.0	22.3	39.5	③
201.59	2.3	25.5	27.8	39.5	⑤
** 62.65	2.3	32.5	34.8	39.5	①

ENGINEERING TEST REPORT

- Continued -

[Environment]

Temperature : 23 °C Humidity : 69 %

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)
④ Record mode (0 dBmV NTSC TV Signal Input)
⑤ Record mode (25 dBmV NTSC TV Signal Input)

2)** : To except the effect of lower sideband of sound sub-carrier frequency component, if set the resolution bandwidth of spectrum analyzer to 30 kHz, these interference become to this value.

3) The correction factor consist of the voltage loss of the impedance matching transformer and the coaxial cable used for the test. And the meter readings described above are corrected by the gain of pre-amplifier.

[Sample calculation]

Frequency	:	47.85	[MHz] (Test Channel #3)
Meter Reading	:	16.2	[dBμV/50Ω]
Correction Factor	:	2.3	[dB]

Then, the emission level is calculated as follows.

Signal Level = 16.2 + 2.3 = 18.5 [dBμV/75Ω]

[Summary of Test Results]

Minimum margin was 4.6 dB at 55.96 MHz, test channel #3.

Tested Date : September 1,1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

7. TRANSFER SWITCH MEASUREMENT

7.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.115(c)(1)(ii).

7.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.2.

2) Activate the EUT system.

3) Unused RF output terminal is terminated in the proper impedance.

4) Set the spectrum analyzer as follows.

Frequency Span	: 1 MHz
Resolution bandwidth	: 100 kHz
Video bandwidth	: 3 MHz
Detector function	: Peak mode

5) The antenna input terminal is connected to the input of pre-amplifier through the matching transformer with a calibrated 50 ohms coaxial cable. And the output of pre-amplifier is connected to the spectrum analyzer.

6) Then, the signal level on the antenna input terminal is measured under the EUT condition produced the maximum signal level.

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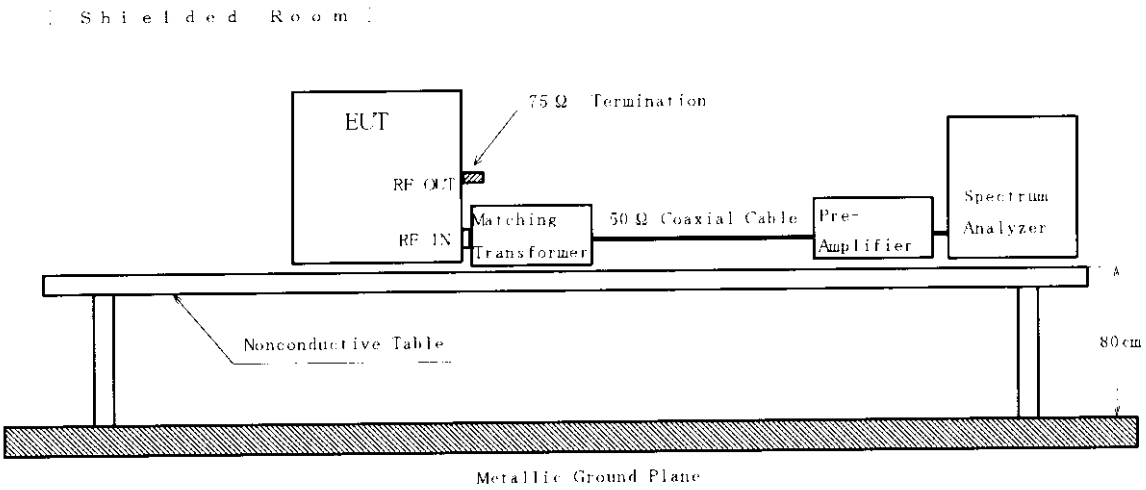
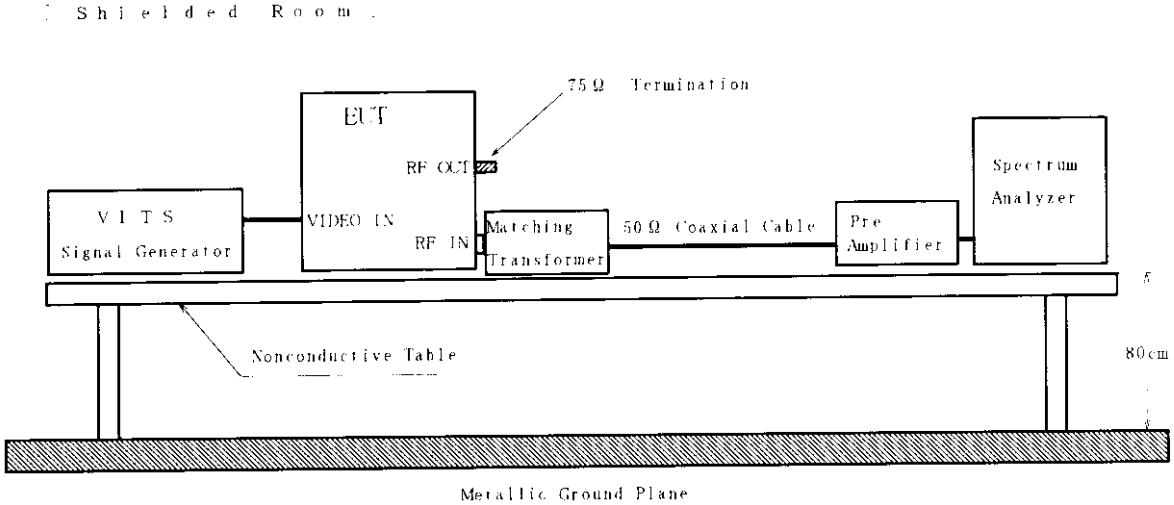
7.3 Test Configuration

① Playback mode



② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)



ENGINEERING TEST REPORT

7.5 Test Results

Emission Frequency [MHz]	Corr. Factor [dB]	Meter Reading [dBμV/50Ω]	Maximum Signal Level [dBμV/75Ω]	Limit [dBμV/75Ω]	Maximum EUT Operation (*)
Test Channel #3					
61.25	2.3	2.4	4.7	9.5	①~③
Test Channel #4					
67.25	2.3	4.0	6.3	9.5	①~③

[Environment]

Temperature : 23 ℃ Humidity : 69 %

[Note]

1) * : ① Playback mode
② Record mode (1V VITS Signal Input)
③ Record mode (5V VITS Signal Input)

2) The correction factor consist of the voltage loss of the impedance matching transformer and the coaxial cable used for the test. And the meter readings described above are corrected by the gain of pre-amplifier.

[Sample calculation]

Frequency : 61.25 [MHz] (Test Channel #3)
Meter Reading : 2.4 [dBμV/50Ω]
Correction Factor : 2.3 [dB]

Then, the signal level is calculated as follows.

Signal Level = 2.4 + 2.3 = 4.7 [dBμV/75Ω]

[Summary of Test Results]

Minimum margin was 3.2 dB at 67.25 MHz, test channel #4.

Tested Date : September 1, 1998

Signature Y. Kotani
Yoshiko Kotani

ENGINEERING TEST REPORT

8. LIST OF TEST INSTRUMENTS

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
Test Receiver	Rohde & Schwarz	ESH3	Frequency Range 9 kHz - 30 MHz	FS-48-2	3	1998/6	1999/6
		ESVD	Frequency Range 20 MHz - 2.05 GHz	FS-79	4	1998/2	1999/2
Spectrum Analyzer	Hewlett Packard	8568B	Frequency Range 100 Hz - 1.5 GHz	FS-46-3	3,5, 6,7	1998/6	1999/6
	Advantest	R3261C	Frequency Range 9 kHz - 2.6 GHz	SA-41	4	1998/8	1999/8
Pre-Amplifier	Anritsu	MH648A	Frequency Range 100 kHz - 1.2 GHz	AM-28	6,7	1998/6	1999/6
Line Impedance Stabiliza -tion Network	Kyoritsu	KNW-407	Frequency Range 150 kHz - 30 MHz Impedance 50 Ω / 50 μH Capacity AC250V, 15A	FL-107	3	1998/4	1999/4
Biconical Antenna	Schwarzbeck	BBA9106	Frequency Range 30 MHz - 300 MHz	AN-94	4	1998/2	1999/2
Log-Periodic Antenna	Schwarzbeck	UHALP 9108A	Frequency Range 300 MHz - 1 GHz	AN-217	4	1998/2	1999/2
Turned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25 MHz - 500 MHz	AN-135	—	1998/2	1999/2
		KBA-611S	Frequency Range 500 MHz - 1 GHz	AN-137	—	1998/2	1999/2

ENGINEERING TEST REPORT

- Continued -

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
Video Part Signal Generator	Anritsu	MG3601A	Frequency Range 100 kHz - 1.04 GHz	SG-41	3,4, 5,6	1997/9	1998/9
Audio Part Signal Generator	Anritsu	MG3601A	Frequency Range 100 kHz - 1.04 GHz	SG-48	3,4, 5,6	1997/9	1998/9
Multiburst Signal Generator	Anritsu	MG318A	According to ANSI C63.4(1992) Section 12 Fig.15	MG-35	3,4, 5,6,7	1997/12	1998/12
Matching Trans-former	Anritsu	MG614A	Frequency Range 10 MHz - 1.2 GHz	AX-28-2	5,6,7	1997/11	1998/11
				AX-28-4	3,4, 5,6	1997/11	1998/11
Four-Port Junction Pad	Anritsu	MP659A	Frequency Range 40 MHz - 1 GHz	AX-16	3,4, 5,6	1997/11	1998/11

Designated by Ministry of International Trade and Industry

KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE
6-8-7, NISHITEMMA
KITA-KU, OSAKA, 530 JAPAN

KEC

IKOMA
TESTING LABORATORY
10630, TAKAYAMA-CHO
IKOMA-CITY, NARA, 630-01 JAPAN

Corporate Juridical Person

ENGINEERING TEST REPORT

REPORT NO. A-024-98-C1 Issued Date : September 9, 1998

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.

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

Device Name : Video Cassette Recorder
Trade Name : TOSHIBA
Model Number : M-625
Serial Number : WS-0002 ☒ Prototype ☐ Pre-production ☐ Production
Date of Manufacture : July, 1998

3. Test Items and Procedure

☒ AC Power Line Conducted Emission Measurement
☒ Radiated Emission Measurement
☒ Antenna Power Conduction Measurement
☒ Picture Sensitivity Measurement
☒ Noise Figure Measurement

Above all tests were performed under :
ANSI C63.4-1992, FCC/OET MP-2
IEEE Std 187-1990, IEEE Std 190, IEEE Std 213-1987

4. Date

Receipt of Test Sample : July 29, 1998
Test Completed on : September 2, 1998

CERTIFIED BY : S. Izumi

Seiichi Izumi
Manager of Ikoma Testing Laboratory

ENGINEERING TEST REPORT

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ENGINEERING TEST REPORT

1. GENERAL INFORMATION

1.1 Product Description

The TOSHIBA Model No.M-625 (referred to as the EUT in this report) is a Video Cassette Recorder containing RF modulator and Tuner.

1) Provided Terminals

(1) RF Input Terminal
(2) RF Output Terminal
(3) A/V Input Terminals
(4) A/V Output Terminals

2) Tuning Range

TV : VHF/2~13ch., UHF/14~69ch.
CATV : VHF/5A, LOW/A-5~A-1, MID/A~I,SUPER/J~W,HYPER/W+1~W+58, W+59~W+84

3) Type of Circuit

Superheterodyne, IF : 45.75 MHz

4) Type of Antenna Input Connector : Type "F" Connector 75Ω (Unbalanced)

5) Rated Power Supply : AC 120 V, 60 Hz

1.2 Description for Equipment Authorization

1) Rules Part(s) under which Equipment operated

FCC Rule Part 15, Subpart B : TV Broadcast Receiver in Unintentional Radiators.

2) Kind of Equipment Authorization

( ) Certification (x) Verification

3) Procedure of Application

( ) Original Equipment (x) Modification

1.3 Test Facility

Name : KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC)
IKOMA TESTING LABORATORY
Open Test Site No.4
Shielded Room No.4

Address : 10630, 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 laboratory has 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 Internaitonal, UK), TUV Product Service(GER) and TUV Rheinland(GER) based on their criteria for testing laboratory (EN45001).

ENGINEERING TEST REPORT

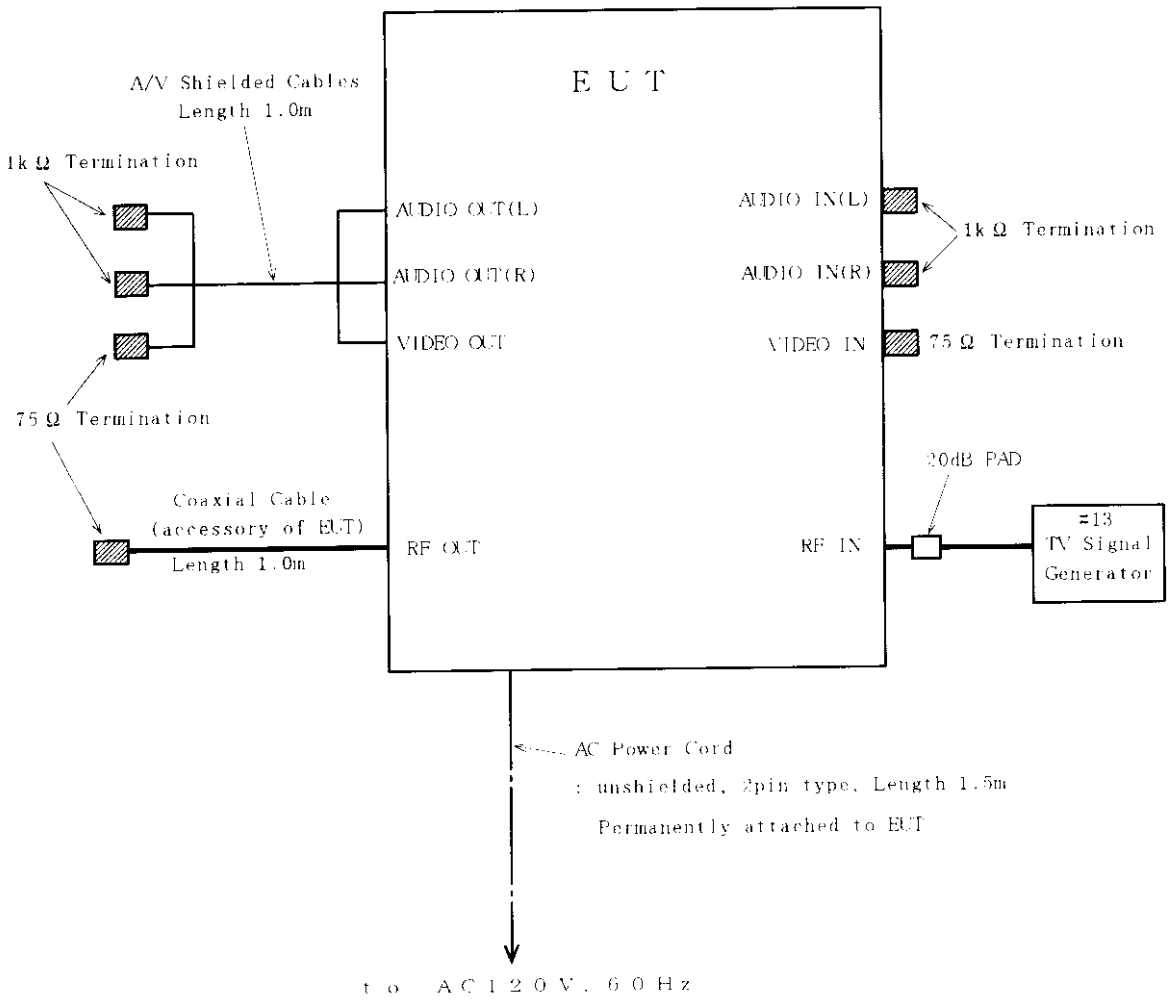
2. TESTED SYSTEM

2.1 Test Planning and Test Mode

Tests were performed with the accessories normally marketed with the device.

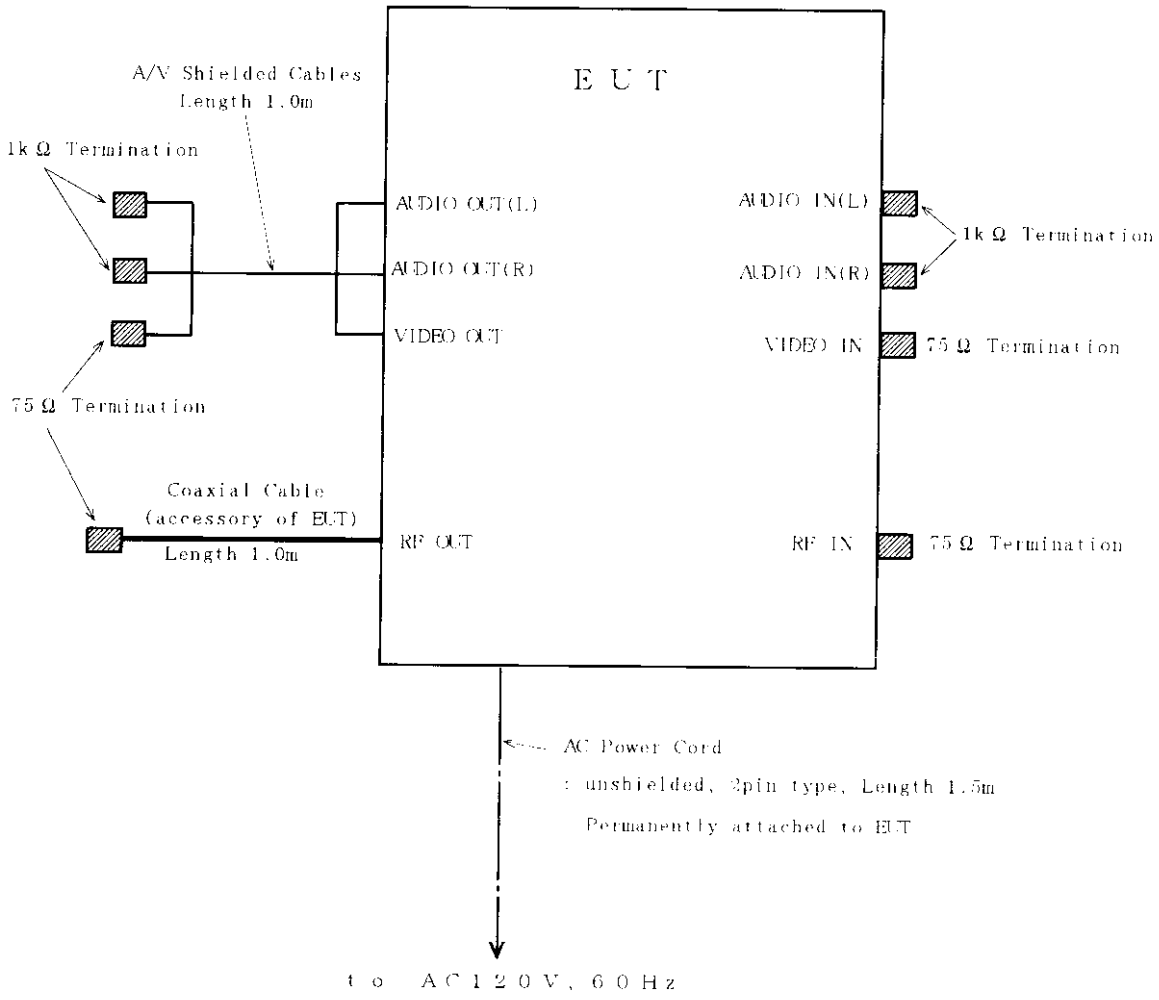
2.2 Block Diagram of EUT System

2.2.1 AC Power Line Conducted Emission Measurement



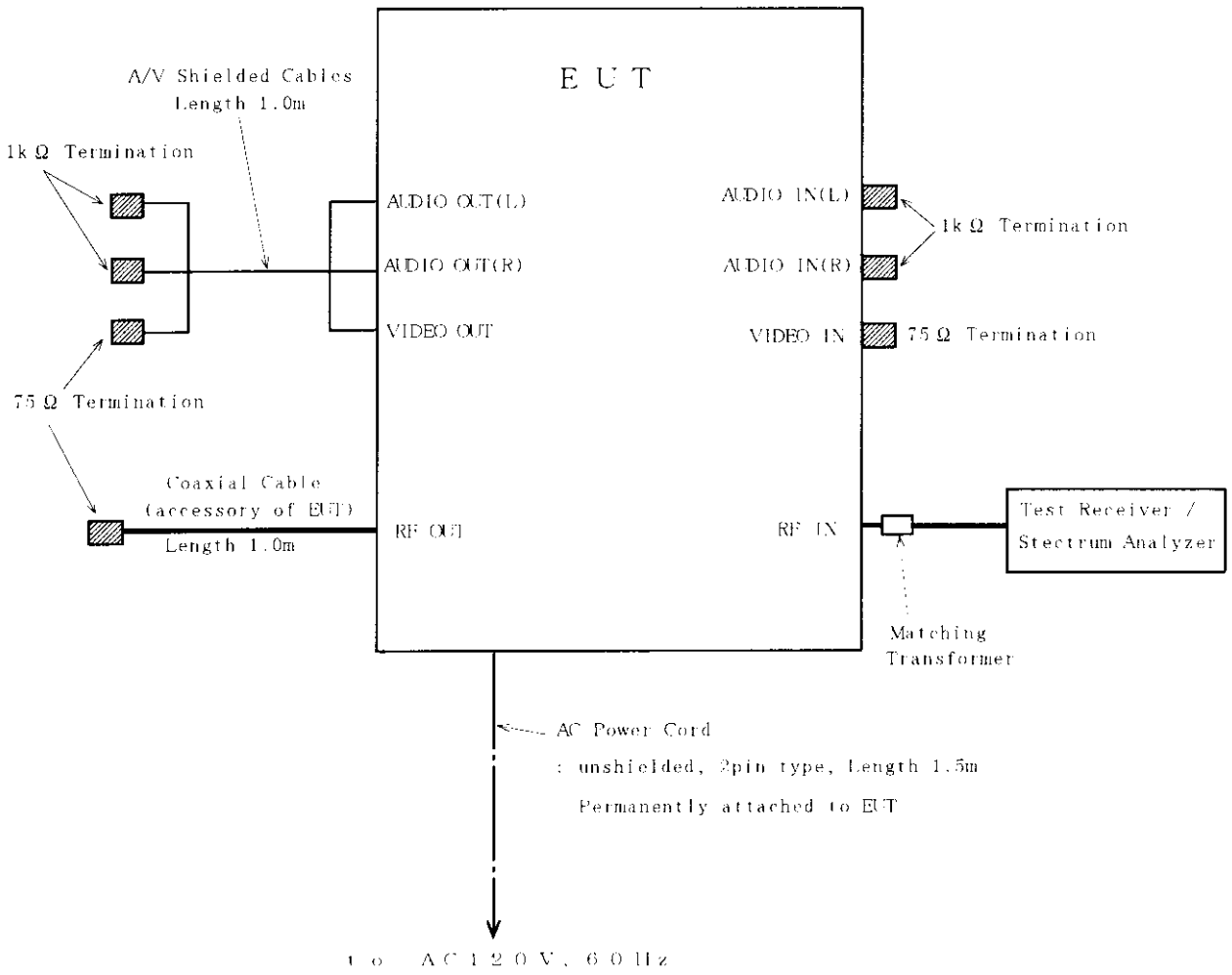
ENGINEERING TEST REPORT

2.2.2 Radiated Emission Measurement



ENGINEERING TEST REPORT

2.2.3 Antenna Power Conduction Measurement



ENGINEERING TEST REPORT

3. AC POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.107(a).

3.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 7 and 12.1, IEEE Std 213-1987. See also the block diagram and the photographs of EUT System configuration in this report.

2) Connect the EUT's AC power cord to Line Impedance Stabilization Network(LISN).

3) Warm up the EUT System.

4) Activate the EUT System and run the software prepared for the test, if require.

5) The standard TV signal is supplied to the EUT through a 20dB,75Ω antenna coupling pad. The tested TV channel is US 13ch.

6) Using a calibrated coaxial cable, connect the spectrum analyzer(*1) to the measuring port of the LISN for the EUT.

7) To find out an EUT System condition produces the maximum emission, change the EUT System configuration, the position of the cables, and the EUT operation mode under normal usage of the EUT.

8) The spectrum are scanned from 450 kHz to 30 MHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

9) The test receiver(*2) is connected to the LISN for the EUT, and the minimum six highest emissions recorded above are measured.

[Note]

(*1) : Spectrum Analyzer Set Up Conditions

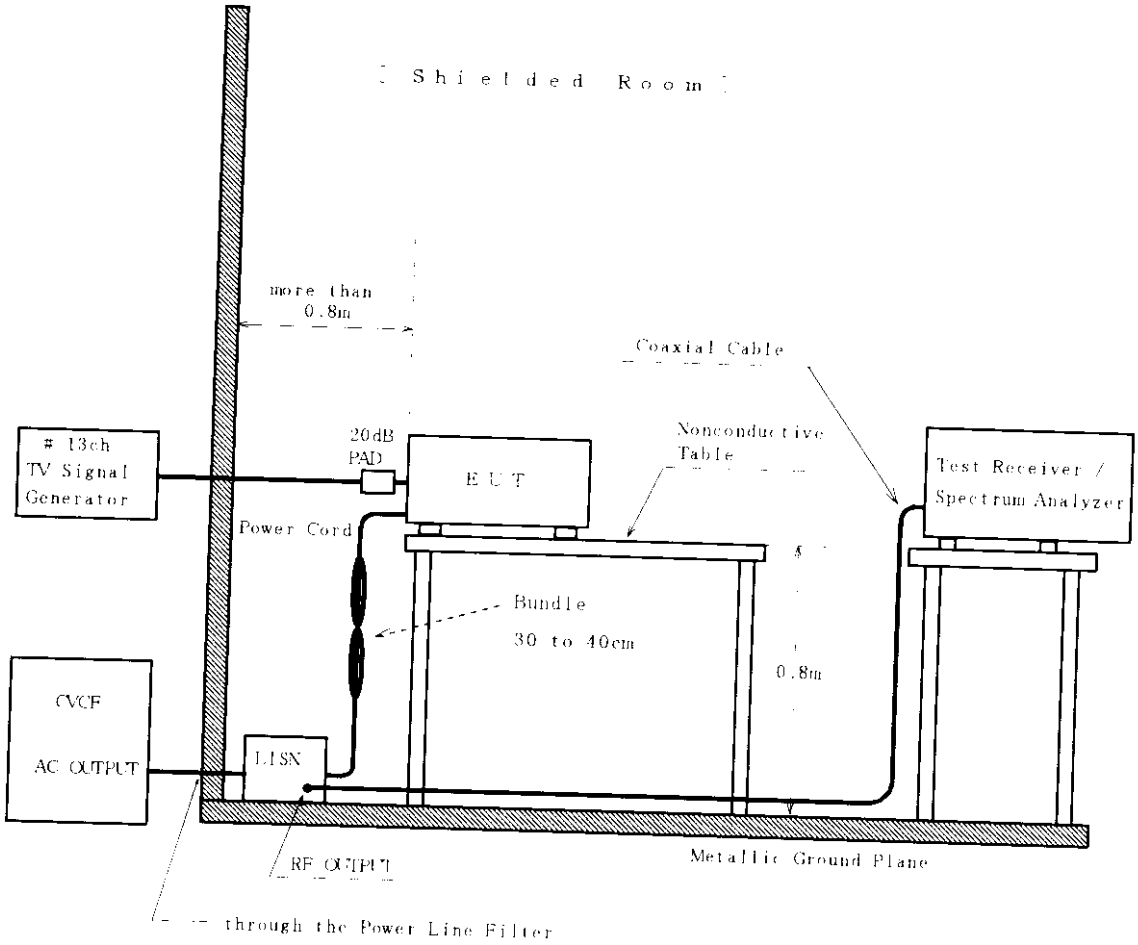
Frequency range	:	450 kHz - 30 MHz
Resolution bandwidth	:	10 kHz
Video bandwidth	:	1 MHz

(*2) : Test Receiver Set Up Conditions

Detector function	:	Quasi-Peak / Average (if necessary)
IF bandwidth	:	9 kHz

ENGINEERING TEST REPORT

3.3 Test Configuration



ENGINEERING TEST REPORT

3.5 Test Results

Emission Frequency [MHz]	LISN Correction Factor [dB]	Meter Reading [dBμV] One-end to Ground	Meter Reading [dBμV] Other-end to Ground	Maximum RF Voltage [dBμV]	Limit [dBμV]
(Measurement with the Quasi-Peak detector)					
0.5264	0.1	28.3	24.6	28.4	48.0
0.8410	0.1	26.1	23.7	26.2	48.0
1.262	0.1	23.6	22.8	23.7	48.0
28.57	1.3	32.5	31.5	33.8	48.0
29.58	1.3	36.0	34.6	37.3	48.0
29.72	1.3	35.4	33.8	36.7	48.0

[Note]

LISN Correction Factor includes the cable loss.

[Environment]

Temperature : 26 ℃ Humidity : 75 %

[Sample Calculation]

Frequency : 0.5264 [MHz]
Meter Reading : 28.3 [dBμV] (at One-end to Ground)
LISN Corr. Factor : 0.1 [dB]

Then, RF voltage is calculated as follows.

RF Voltage = 28.3 + 0.1 = 28.4 [dBμV]

[Summary of Test Results]

Minimum margin was 10.7 dB at 29.58 MHz, one-end to ground.

Tested Date : August 28, 1998 Signature H Matsuyama
Hironobu Matsuyama

ENGINEERING TEST REPORT

4. RADIATED EMISSION MEASUREMENT

4.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.109(a)(c)(f).

4.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.1, IEEE Std 187-1990, 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 cord for the EUT System is connected the receptacle on the metallic turn floor.

3) Warm up the EUT System.

4) Activate the EUT System and run the prepared software for the test, if require.

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 produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

7) The spectrum are scanned from 30 MHz to 1.7 GHz and collect the minimum six highest emissions on the spectrum analyzer relative to the total limits.

8) In final compliance test, the local oscillator emissions and the minimum six highest emissions 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) or the spectrum analyzer(*2).

[Note]

(*1) : Spectrum Analyzer Set Up Conditions (below 1 GHz)
Resolution bandwidth : 100 kHz
Video bandwidth : 1 MHz

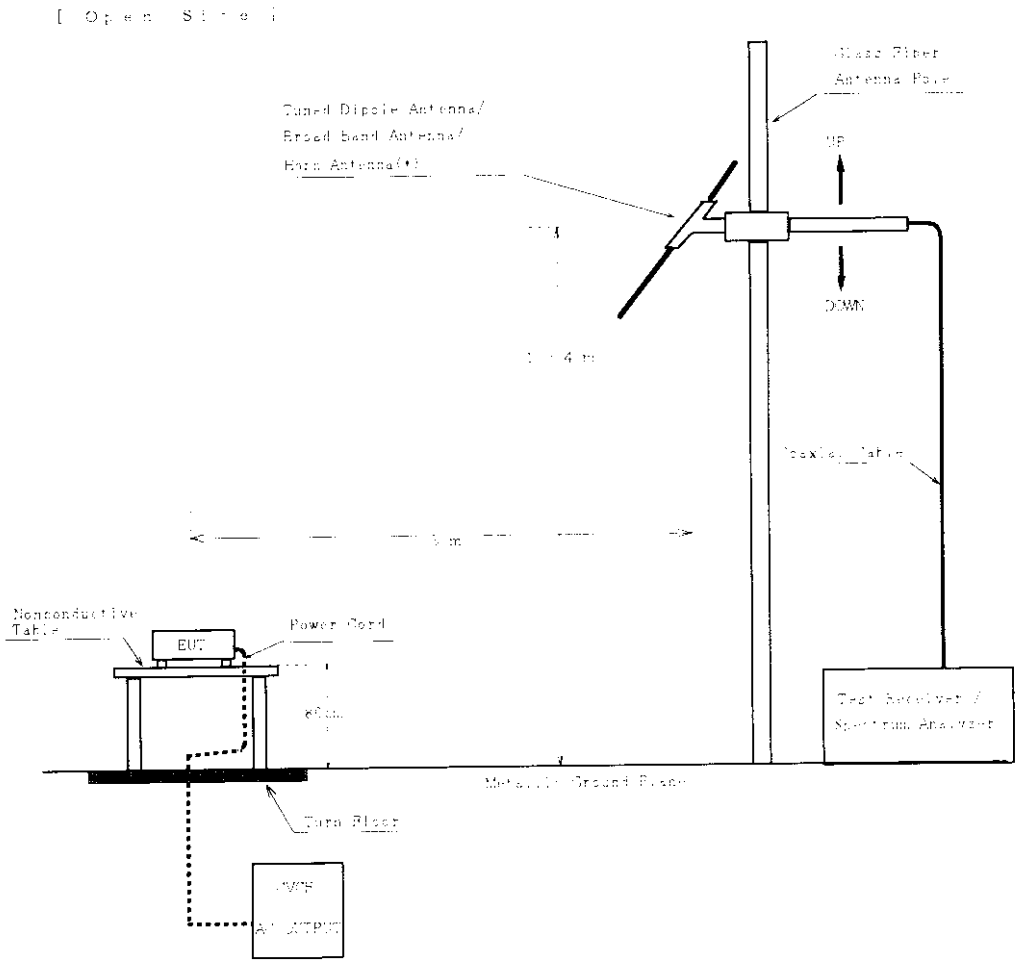
(*2) : Spectrum Analyzer Set Up Conditions (above 1 GHz)
Resolution bandwidth : 1 MHz
Video bandwidth : 1 MHz

(*3) : Test Receiver Set Up Conditions (below 1 GHz)
Detector function : Quasi-Peak
IF bandwidth : 120 kHz

(*4) : Test Receiver Set Up Conditions (above 1 GHz)
Detector function : Average
IF bandwidth : 1 MHz

ENGINEERING TEST REPORT

4.3 Test Configuration



[Note]

(*) : In frequency range above 1 GHz use only.

ENGINEERING TEST REPORT

4.5 Test Results

[ON AIR CHANNEL --- below 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
TV VHF Fundamental						
2	101	11.2	4.7	<5.0	<16.2	43.5
3	107	12.0	4.0	4.9	16.9	43.5
4	113	12.9	3.2	5.6	18.5	43.5
5	123	14.1	3.4	5.9	20.0	43.5
6	129	14.5	5.3	5.6	20.1	43.5
7	221	18.2	4.8	<5.0	<23.2	46.0
8	227	18.3	3.8	2.1	22.1	46.0
9	233	18.4	3.6	3.2	22.0	46.0
10	239	18.6	5.1	4.0	23.7	46.0
11	245	18.7	6.7	6.2	25.4	46.0
12	251	18.8	10.7	7.1	29.5	46.0
13	257	19.2	11.7	8.1	30.9	46.0
TV VHF 2nd Harmonic						
2	202	17.8	<0.0	<0.0	<17.8	43.5
3	214	18.1	<0.0	<0.0	<18.1	43.5
4	226	18.3	1.5	<0.0	19.8	46.0
5	246	18.7	5.6	3.4	24.3	46.0
6	258	19.3	9.0	6.0	28.3	46.0
7	442	20.2	5.3	5.9	26.1	46.0
8	454	20.5	6.4	4.5	26.9	46.0
9	466	20.8	6.5	4.1	27.3	46.0
10	478	21.1	5.2	4.0	26.3	46.0
11	490	21.4	3.8	3.8	25.2	46.0
12	502	21.7	3.6	3.3	25.3	46.0
13	514	22.0	2.7	2.4	24.7	46.0

ENGINEERING TEST REPORT

- Continued -

[ON AIR CHANNEL --- below 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
TV UHF Fundamental						
14	517	22.1	11.8	12.4	34.5	46.0
19	547	22.8	12.8	14.3	37.1	46.0
28	601	24.1	14.8	17.8	41.9	46.0
36	649	24.8	14.4	14.7	39.5	46.0
44	697	25.4	14.3	13.4	39.7	46.0
53	751	25.9	10.6	8.1	36.5	46.0
61	799	26.4	9.9	7.2	36.3	46.0
69	847	26.9	11.5	10.5	38.4	46.0

[ON AIR CHANNEL --- above 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Pre·AMP Gain	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	[dB]	Horiz. [dBμV]	Vert. [dBμV	[dBμV/m]	[dBμV/m]
TV UHF 2nd Harmonic							
14	1034	25.0	37.2	42.3	41.6	30.1	54.0
19	1094	23.6	37.1	42.4	41.1	28.9	54.0
28	1202	24.5	37.0	40.3	41.9	29.4	54.0
36	1298	23.3	36.8	40.8	43.5	30.0	54.0
44	1394	22.5	36.7	39.7	43.1	28.9	54.0
54	1514	23.1	36.5	40.5	41.2	27.8	54.0
61	1598	22.2	36.3	37.5	38.3	24.2	54.0
69	1694	22.6	36.2	43.4	43.1	29.8	54.0

ENGINEERING TEST REPORT

- Continued -

[CATV CHANNEL --- below 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
CATV Fundamental						
1	119	13.7	3.0	6.1	19.8	43.5
95	137	15.1	4.2	4.1	19.3	43.5
97	149	15.8	9.6	9.3	25.4	43.5
99	161	16.3	14.3	7.1	30.6	43.5
14	167	16.7	14.3	7.0	31.0	43.5
18	191	17.5	5.6	2.5	23.1	43.5
22	215	18.1	6.2	3.2	24.3	43.5
23	263	19.6	12.2	9.7	31.8	46.0
29	299	21.8	15.8	9.5	37.6	46.0
36	341	18.5	18.1	12.3	36.6	46.0
37	347	18.6	14.3	12.2	32.9	46.0
65	515	22.0	12.3	13.2	35.2	46.0
94	689	25.3	15.3	15.2	40.6	46.0
100	695	25.4	14.3	13.8	39.7	46.0
113	773	26.1	9.8	7.3	35.9	46.0
125	845	26.9	11.0	10.1	37.9	46.0
CATV 2nd Harmonic						
1	238	18.5	3.4	0.7	21.9	46.0
95	274	20.3	7.6	7.2	27.9	46.0
97	298	21.7	10.1	4.4	31.8	46.0
99	322	18.3	15.3	10.3	33.6	46.0
14	334	18.4	18.1	11.2	36.5	46.0
18	382	19.0	10.3	5.1	29.3	46.0
22	430	19.9	5.3	7.3	27.2	46.0
23	526	22.3	2.2	2.5	24.8	46.0
29	598	24.1	1.7	3.7	27.8	46.0
36	682	25.2	3.6	4.1	29.3	46.0
37	694	25.4	3.8	3.5	29.2	46.0

ENGINEERING TEST REPORT

- Continued -

[CATV CHANNEL --- above 1GHz] [Distance : 3m]

Measurement Frequency		Antenna Factor	Pre.AMP Gain	Meter Reading		Maximum Field Strength	Limits
Ch.	[MHz]	[dB/m]	[dB]	Horiz. [dBμV]	Vert. [dBμV]	[dBμV/m]	[dBμV/m]
CATV 2nd Harmonic							
65	1030	25.1	37.2	43.0	41.5	30.9	54.0
94	1378	22.7	36.7	40.6	43.9	29.9	54.0
100	1390	22.6	36.7	40.9	43.3	29.2	54.0
113	1546	22.7	36.4	40.3	40.8	27.1	54.0
125	1690	22.6	36.2	43.6	42.4	30.0	54.0

[Note]

Antenna factor includes the loss of coaxial cable used for the test.

[Environment]

Temperature : 24 ℃ Humidity : 46 %

[Sample calculation]

Frequency : 1030 [MHz] (CATV 65ch. 2nd Harmonic)
Meter Reading : 43.0 [dBμV] (at Horiz. Polarization)
Antenna Factor : 25.1 [dB/m]
Pre-AMP Gain : 37.2 [dB]

Then, Field Strength is calculated as follows.

Field Strength = 43.0 + 25.1 - 37.2 = 30.9 [dBμV/m]

[Summary of Test Results]

Minimum margin was 4.1 dB at 601 MHz, UHF 28ch (Fundamental) vert.polarization.

Tested Date : August 17, 1998 Signature H.Matsuyama
Hironobu Matsuyama

ENGINEERING TEST REPORT

5. ANTENNA POWER CONDUCTION MEASUREMENT

5.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.111(a).

5.2 Test Procedure

1) Configurate the EUT System in accordance with ANSI C63.4-1992 section 12.1, the block diagram and the photographs of EUT System configuration in this report.

2) Power cord for the EUT System is connected the receptacle of LISN.

3) Connect the antenna terminal of EUT to the test receiver or the spectrum analyzer by using the matching transformer and the coaxial cable.

4) Warm up the EUT System.

5) Activate the EUT System and run the prepared software for the test, if require.

6) To find out the emissions of the EUT System, preliminary measurement is performed by using the spectrum analyzer(*1).
In the frequency above 1 GHz, it is performed by using the spectrum analyzer(*2).

7) To find out an EUT System condition produces the maximum emission, change the position of the cables, and the EUT operation mode under normal usage of the EUT.

8) The spectrum are scanned from 30 MHz to 1.7 GHz and collect the highest emissions on the spectrum analyzer relative to the limit.

9) In final compliance test, the local oscillator emissions and the highest emissions recorded above are measured by using the test receiver(*3).
In the frequency above 1 GHz, the measurements are performed by the test receiver(*4) or the spectrum analyzer(*2).

[Note]

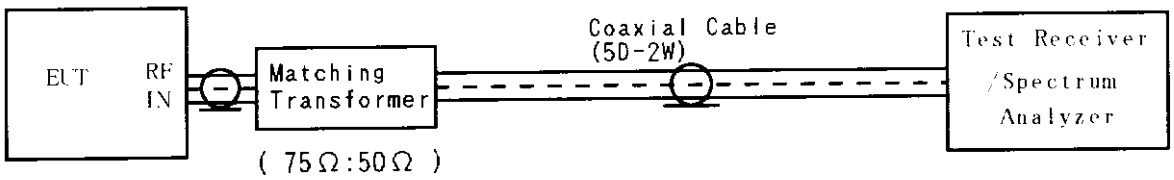
(*1) : Spectrum Analyzer Set Up Conditions (below 1 GHz)
Resolution bandwidth : 100 kHz
Video bandwidth : 1 MHz

(*2) : Spectrum Analyzer Set Up Conditions (above 1 GHz)
Resolution bandwidth : 1 MHz
Video bandwidth : 1 MHz

(*3) : Test Receiver Set Up Conditions (below 1 GHz)
Detector function : Quasi-Peak
IF bandwidth : 120 kHz

(*4) : Test Receiver Set Up Conditions (above 1 GHz)
Detector function : Average
IF bandwidth : 1 MHz

5.3 Test Configuration



ENGINEERING TEST REPORT

5.4 Test Results

[ON AIR CHANNEL]

Measurement Frequency		Correction Factor	Meter Reading	Conversion Factor [dBμV] to [dBnW]	Antenna Power Conduction	Limit*
ch.	[MHz]	[dB]	[dBμV]	[dB]	[dBnW]	[dBnW]
TV VHF Fundamental						
2	101	6.5	26.3	-48.8	-16.0	3.0
3	107	6.5	21.9	-48.8	-20.4	3.0
4	113	6.5	18.3	-48.8	-24.0	3.0
5	123	6.5	13.9	-48.8	-28.4	3.0
6	129	6.5	11.9	-48.8	-30.4	3.0
7	221	6.5	7.4	-48.8	-34.9	3.0
8	227	6.5	6.7	-48.8	-35.6	3.0
9	233	6.5	6.5	-48.8	-35.8	3.0
10	239	6.5	6.9	-48.8	-35.4	3.0
11	245	6.5	7.8	-48.8	-34.5	3.0
12	251	6.5	9.0	-48.8	-33.3	3.0
13	257	6.5	10.2	-48.8	-32.1	3.0
TV VHF 2nd Harmonic						
2	202	6.5	<0.0	-48.8	<-42.3	3.0
3	214	6.5	<0.0	-48.8	<-42.3	3.0
4	226	6.5	<0.0	-48.8	<-42.3	3.0
5	246	6.5	0.3	-48.8	-42.0	3.0
6	258	6.5	2.9	-48.8	-39.4	3.0
7	442	6.5	6.6	-48.8	-35.7	3.0
8	454	6.5	6.6	-48.8	-35.7	3.0
9	466	6.5	7.0	-48.8	-35.3	3.0
10	478	6.5	7.6	-48.8	-34.7	3.0
11	490	6.5	8.1	-48.8	-34.2	3.0
12	502	6.5	8.5	-48.8	-33.8	3.0
13	514	6.5	8.8	-48.8	-33.5	3.0
TV UHF Fundamental						
14	517	6.5	3.0	-48.8	-39.3	3.0
19	547	6.5	3.4	-48.8	-38.9	3.0
28	601	6.5	12.1	-48.8	-30.2	3.0
36	649	6.5	18.0	-48.8	-24.3	3.0
44	697	6.5	20.1	-48.8	-22.2	3.0
53	751	6.5	19.7	-48.8	-22.6	3.0
61	799	6.5	18.1	-48.8	-24.2	3.0
69	847	6.5	18.1	-48.8	-24.2	3.0
TV UHF 2nd Harmonic						
14	1034	6.8	<10.0	-48.8	<-32.0	3.0
19	1094	6.8	12.0	-48.8	-30.0	3.0
28	1202	6.8	11.0	-48.8	-31.0	3.0
36	1298	6.8	13.0	-48.8	-29.0	3.0
44	1394	6.8	17.9	-48.8	-24.1	3.0
53	1502	6.8	15.1	-48.8	-26.9	3.0
61	1598	6.9	<10.0	-48.8	<-31.9	3.0
69	1694	6.8	12.7	-48.8	-29.3	3.0

[Note] *) 3.0[dBnW] in Limit is equal to 2[nW].

ENGINEERING TEST REPORT

- Continued -

[CATV CHANNEL]

Measurement Frequency		Correction Factor	Meter Reading	Conversion Factor [dBμV] to [dBnW]	Antenna Power Conduction	Limit*
ch.	[MHz]	[dB]	[dBμV]	[dB]	[dBnW]	[dBnW]
CATV Fundamental						
1	119	6.5	15.7	-48.8	-26.6	3.0
95	137	6.5	10.4	-48.8	-31.9	3.0
97	149	6.5	8.1	-48.8	-34.2	3.0
99	161	6.5	5.9	-48.8	-36.4	3.0
14	167	6.5	4.5	-48.8	-37.8	3.0
18	191	6.5	13.7	-48.8	-28.6	3.0
22	215	6.5	8.4	-48.8	-33.9	3.0
23	263	6.5	11.1	-48.8	-31.2	3.0
29	299	6.5	10.6	-48.8	-31.7	3.0
36	341	6.5	14.6	-48.8	-27.7	3.0
37	347	6.5	13.6	-48.8	-28.7	3.0
65	515	6.5	3.5	-48.8	-38.8	3.0
94	689	6.5	19.7	-48.8	-22.6	3.0
100	695	6.5	19.9	-48.8	-22.4	3.0
113	773	6.6	18.7	-48.8	-23.5	3.0
125	845	6.6	18.0	-48.8	-24.2	3.0
CATV 2nd Harmonic						
1	238	6.5	<0.0	-48.8	<-42.3	3.0
95	274	6.5	7.7	-48.8	-34.6	3.0
97	298	6.5	13.9	-48.8	-28.4	3.0
99	322	6.5	19.7	-48.8	-22.6	3.0
14	334	6.5	15.1	-48.8	-27.2	3.0
18	382	6.5	13.3	-48.8	-29.0	3.0
22	430	6.5	7.4	-48.8	-34.9	3.0
23	526	6.5	9.0	-48.8	-33.3	3.0
29	598	6.5	8.1	-48.8	-34.2	3.0
36	682	6.5	15.0	-48.8	-27.3	3.0
37	694	6.5	15.8	-48.8	-26.5	3.0
65	1030	6.8	<10.0	-48.8	<-32.0	3.0
94	1378	6.8	17.9	-48.8	-24.1	3.0
100	1390	6.8	17.8	-48.8	-24.2	3.0
113	1546	6.8	15.5	-48.8	-26.5	3.0
125	1690	6.8	13.1	-48.8	-28.9	3.0

[Note] *) 3.0[dBnW] in Limit is equal to 2[nW].

ENGINEERING TEST REPORT

- Continued -

[Environment]

Temperature : 23 ℃ Humidity : 64 %

[Note]

The correction factor consist of the voltage loss of the impedance matching transformer (50Ω : 75Ω) and the coaxial cable used for the test.

[Sample calculation]

Frequency	:	101	[MHz] (VHF 8ch Fundamental)
Meter Reading	:	26.3	[dBμV]
Correction Factor	:	6.5	[dB]
Conversion Factor	:	-48.8	[dB] (dBμV to dBnW)

Then, the antenna Power Conduction is calculated as follows.

Antenna Power Conduction = 26.3 + 6.5 - 48.8 = -16.0 [dBnW]

[Summary of Test Results]

Minimum margin was 19.0 dB at 101 MHz(VHF #2ch) at Fundamental.

Tested Date : September 2, 1998 Signature H. Matsuyama
Hironobu Matsuyama

ENGINEERING TEST REPORT

6. PICTURE SENSITVITY MEASUREMENT

6.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.117(f).

6.2 Test Procedure

1) Configurate the EUT system in accordance with IEEE Std 190, and 6.3 Test Configuration in this report.

2) Active and warm up the EUT system.

3) Connect the antenna terminal of EUT to the standard signal generator by using the matching transformer and coaxial cable, and connect the video out terminal of EUT to the band pass filter(*1) and oscilloscope(*2) by using the coaxial cables.

4) The frequency of the standard signal generator(*3) is adjusted the tuned frequency of EUT.

5) The frequency and output level of standard signal generator are adjusted, until the specified video output level of EUT system is appeared on the oscilloscope.

6) The measurement are performed at US VHF channel 2,6,7 and 13, and US UHF channel 14, 44 and 69.

[Note]

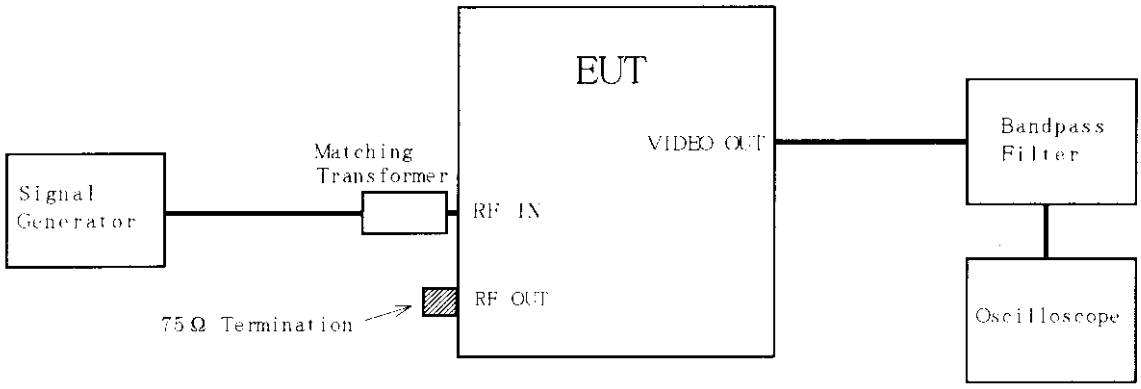
(*1) Band pass filter set up conditions
Start Frequency : 600 Hz
Stop Frequency : 2000 Hz

(*2) Oscilloscope set up conditions
Sweep Time : 0.1 msec.
Volt/Div. : 0.5 V

(*3) Standard signal generator set up conditions
Modulation : Amplitude modulation
Modulating Frequency : 1000 Hz
Percent modulation : 30%

ENGINEERING TEST REPORT

6.3 Test Configuration



6.4 Test Results

VHF Measurement Frequency		Antenna Input Level		UHF Measurement Frequency		Antenna Input Level	
ch.	[MHz]	[dBm]	[pW]	ch.	[MHz]	[dBm]	[pW]
2	55.25	-85.5	2.818	14	471.25	-82.8	5.248
6	83.25	-88.8	1.318	44	651.25	-81.2	7.586
7	175.25	-85.2	3.020	69	801.25	-81.5	7.079
13	211.25	-85.0	3.162				
AVERAGE "VHF"			2.580	AVERAGE "UHF"			6.638

AVERAGE UHF/VHF : $10 \log \frac{\text{"UHF" pW}}{\text{"VHF" pW}} = 4.1$ dB

[Limit 8.0 dB]

[Environment]
Temperature : 23 ℃ Humidity : 64 %

[Summary of Test Results]
Margin was 3.9 dB.

Tested Date : September 2, 1998 Signature

Ikuya Minematsu

ENGINEERING TEST REPORT

7.NOISE FIGURE MEASUREMENT

7.1 Reference Rule and Specification

FCC Rule Part 15, Section 15.117(g).

7.2 Test Procedure

1) Configurate the EUT system in accordance with FCC/OET MP-2, and 7.3 Test Configuration in this report.

2) Active and warm up the EUT system.

3) Connect the antenna input terminal of EUT to the correct terminating impedance.

4) Measurement of AGC voltage of EUT are made at the measurement channels.

5) Connect the antenna input terminal of EUT to the Noise Source of the Noise Figure Indicator(*1) by using the matching transformer, the noise source and coaxial cable. Connect the intermediate frequency terminal on the tuner pack of EUT to the IF INPUT terminal of the Noise Figure Indicator by using the coaxial cable.

6) In final compliance test, the measurement are performed at all US UHF channel by using the noise figure indicator.

7) If ΔF(Noise Figure contribution of the amplifier following the measurement point in dB) exceed 0.3 dB, the measured noise figure is corrected by ΔF. ΔF is calculated the tuner gain(gain of circuit from receiver antenna input terminal to measurement point as a power), the noise figure from receiver antenna input terminal to measurement point as power ratio and the noise figure of that IF amplifier as power radio, therefore the tuner gain shall be measured.

8) For the measurement of the tuner gain, Connect the intermediate frequency terminal on the tuner pack of EUT to the spectrum analyzer(*2) by using the high impedance probe and connect the antenna input terminal of EUT to the standard signal generator by using the matching transformer and the coaxial cable.

9) The frequency of the standard signal generator is adjusted the tuned frequency of EUT.

10) Then, tuner gain is calculated as that the ratio of the output level of intermediate frequency amplifier on the tuner pack of EUT appeared on the spectrum analyzer minus the output level of the standard signal generator and ΔF is calculated.

[Note]

(*1) Noise Figure Indicator set up conditions
Frequency Select : 43.5 MHz

(*2) Spectrum analyzer set up conditions
RBW : 30 kHz
VBW : 30 kHz
ATT : 10 dB
Span : 10 MHz

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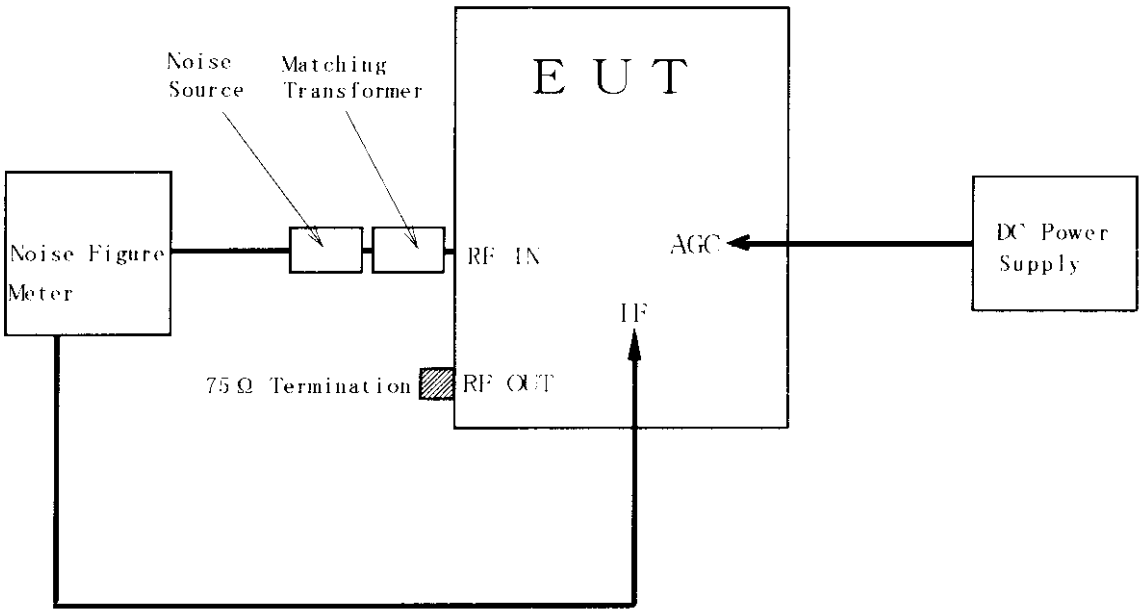
7.3 Test Configuration



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7.4 Test Results

Measurement Frequency		Correction Factor	Meter Reading	Tuner Gain	△F	Noise Figure	Limit
ch.	[MHz]	[dB]	[dBμV]	[dB]	[dB]	[dB]	[dB]
TV UHF							
14	471.25	0.8	9.0	31.4	0.106	8.2	14
20	507.25	0.8	9.5	31.9	0.090	8.7	14
26	543.25	0.8	10.4	32.9	0.065	9.6	14
32	579.25	0.9	10.8	33.8	0.055	9.9	14
38	615.25	0.9	11.0	34.1	0.051	10.1	14
44	651.25	0.9	10.8	34.2	0.052	9.9	14
50	687.25	1.0	10.7	35.1	0.049	9.7	14
56	723.25	1.0	10.9	35.9	0.043	9.9	14
62	759.25	1.1	11.1	34.2	0.051	10.0	14
69	801.25	1.1	10.8	33.0	0.063	9.7	14
Maximum "NF" Channel(38)		0.9	11.0	34.1	0.051	10.1	14

[Note]

(x)The second stage(IF Amp) noise figure contribution did not exceed 0.3dB.
(x)4dB is subtracted from the measured noise figure, because a power splitter is equiped in VCR.

The noise figure contribution of IF amplifier following the measurement point:

$$\triangle F = 10\ \mathrm{Log}_{10}\left\{1+\frac{F_2-1}{F_1\times G_1}\right\}$$

where, △F: Noise figure contribution of the amplifier following the measurement point in dB.
F_1: Noise figure from receiver antenna input terminal to measurement point as power ratio.
F_2: Noise figure of that IF amplifier as power ratio.
G_1: Gain of circuit from receiver antenna input terminals to measurement point as a power gain.

[Environment]

Temperature : 23 ℃ Humidity : 64 %

[Summary of Test Results]

Minimum margin was 3.9 dB at 615.25 MHz, 38ch.

Tested Date : September 2, 1998 Signature

Ikuya Minematsu

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8. LIST OF TEST INSTRUMENTS

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
Test Receiver	Kyoritsu	KNM-2403	Frequency Range 9 kHz - 30 MHz	FS-70	3	1998/4	1998/4
	Rohde & Schwarz	ESVS10	Frequency Range 20 MHz - 1 GHz	FS-82	4,5	1998/2	1999/2
Spectrum Analyzer	Advantest	TR4172	Frequency Range 50 Hz - 1.8 GHz	SA-23	3,5,7	1998/1	1999/1
		R3261C	Frequency Range 9 kHz - 2.6 GHz	SA-41	4	1998/8	1999/8
Pre-Amplifier	Hewlett Packard	8449B	Frequency Range 1 GHz - 26.5 GHz	AM-52	4	1998/4	1999/4
Line Impedance Stabiliza-tion Network	Kyoritsu	KNW-407	Frequency Range 150 kHz - 30 MHz Impedance 50 Ω / 50 μH Capacity AC 250 V, 15 A	FL-72	3	1998/4	1999/4
Biconical Antenna	Schwarzbeck	BBA9106	Frequency Range 30 MHz - 300 MHz	AN-94	4	1998/2	1999/2
Log-Periodic Antenna	Schwarzbeck	UHALP 9108A	Frequency Range 300 MHz - 1 GHz	AN-217	4	1998/2	1999/2
Tuned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25 MHz - 500 MHz	AN-135	—	1998/2	1999/2
		KBA-611S	Frequency Range 500 MHz - 1 GHz	AN-137	—	1998/2	1999/2
Horn Antenna	RAVEN	91888-2	Frequency Range 1 GHz - 2 GHz	AN-167	4	1997/11	1999/11

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- Continued -

Instrument	Manufacturer	Model No	Specifications	KEC Control No.	Test Item	Last Cal.	Next Cal.
IRE TV Signal Generator	Sibasoku	VG40A	NTSC US 4ch, 13ch	MG-43	3	1997/12	1998/12
20dB PAD	Made by KEC		Attenuation 20 dB	MM-39-4	3	—	—
Impedance Trans-former	NMC	MB-009	Frequency Range 10 MHz - 2 GHz 50 Ω : 75 Ω	AX-27	5	1997/11	1998/11
Oscillo-scope	Matsushita	VP-5530B	Frequency Range DC - 300 MHz	OS-18	6	1998/5	1999/5
Filter	Krohn-Hite	3550	Frequency Range 2 Hz - 200 kHz	FL-32	6	1998/3	1999/3
Matching Trans-former	Anritsu	MP614A	Frequency Range 10 MHz - 1.2 GHz 50 Ω : 75 Ω	AX-28-3	6,7	1997/11	1998/11
Standard Signal Generator	Anritsu	MG3601A	Frequency Range 100 kHz - 1.04 GHz	SG-48	6,7	1997/9	1998/9
Noise Figure Meter	Elena	ENF-2005	Frequency Range 10.7MHz - 56.5MHz Noise Source 28 Vp-p	MM-30	7	1998/6	1999/6
Noise Source	Microwave Semiconduc-tor	MC1100	Frequency Range 50 MHz - 1 GHz Noise Ration 15 dB - 16 dB	MM-30-2	7	1998/6	1999/6