

EMC TEST REPORT

Test Report No. : 22CE0024-KT-1

Applicant : ORION ELECTRIC CO., LTD.

Type of equipment : Video Cassette Recorder

Model number : W425

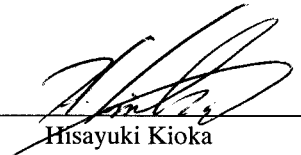
Test standard : FCC Part 15 Subpart B

Test result : Complied

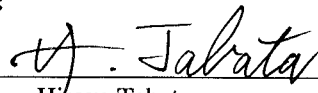
1. This test report shall not be reproduced except in full, without the written approval of A-PEX International Co. Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this test report are traceable to the national or international standards.

Date of test : October 18 to October 21, 2001

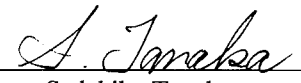
Tested by:


Hisayuki Kioka
Engineer
EMC section

Tested by:


Hiroya Tabata
Engineer
EMC section

Tested by:


Sadahiko Tanaka
Engineer
EMC section

Approved by:


Kazutoshi Hatta
Site assistant manager

Date of issue : October 26, 2001

A-pex International Co., Ltd. Kanto Office EMC Laboratory

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Section 1 : Client information

Company name : ORION ELECTRIC CO., LTD.
Brand Name : TOSHIBA
Address : 41-1 Iehisa-cho, Takefu-shi, Fukui 915-8555 JAPAN
Telephone number : +81-778-23-0019
Facsimile number : +81-778-23-7799
Contact person : Hiroshi Tsujimoto
Section manager
Engineering headquarters
Administration section

Section 2 : Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of equipment : Video Cassette Recorder
Model number : W425
Rating : AC 120 V / 60 Hz
Manufacturer : 1. WORLD ELECTRIC (THAILAND) LTD.
236 Moo 2 Nongchark, Banbung, Chonburi 20170, Thailand
2. KORAT DENKI LTD.
149 Moo 10 Thombol Chokchai, Amphur Chokchai, Nakhonratchasima
30190, Thailand
3. ORION AMERICA, INC.
Hwy 41 North, Orion Place, Princeton, Indiana 47670, U.S.A
Receipt Date of Sample : October 16, 2001
Condition of EUT : Production Prototype

2.2 Product description

ORION ELECTRIC CO., LTD., Model: W425 (referred to as the EUT in this report) is a video cassette recorder. The EUT specifications is as follows.

Tuner type	:	Quartz PLL frequency synthesized
I / F	:	45.75 MHz (Picture), 41.25 MHz (Sound)
Receiving channel	:	VHF 2 – 13 ch / UHF 14 – 69 ch / CATV 1 – 125 ch
Antenna input	:	75 ohm
Video signal	:	NTSC color
Power source	:	AC 120 V / 60 Hz, 9 W
I / O terminal (Video)	:	RCA in 1Vp-p 75 ohm, RCA out 1 Vp-p 75 ohm
I / O terminal (Audio)	:	RCA in –8 dB 50 k ohm, RCA out –8 dB 1 k ohm

Section 3 : Test specification, methods & procedures

3.1 Test specification

Test specification : FCC Part 15 Subpart B

Title : FCC 47 CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators (Subpart C Intentional Radiators)

3.2 Methods & procedures

No.	Item	Test procedure	Limits	Remarks
1	Conducted interference	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	250 uV	LISN
2	Radiated emission	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	30–88 MHz: 100 uV/m 88–216 MHz: 150 uV/m 216–960 MHz: 200 uV/m above 960 MHz: 500 uV/m	3 m
3	Antenna terminal voltage	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	2 nW (at 75 ohm)	—
4	RF output level	ANSI C63.4:1992 IEEE 213:1987	Video signal: 3000 uV Aural signal: 671 uV	—
	Spurious emission	IEEE 187:1990	94.8 uV	—
5	Picture sensitivity	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	8 dB	—
6	Noise figure	FCC/OET MP:2:1986	14 dB	—

3.3 Additions or deviations to standard

No addition, deviation nor exclusion have been made from standards.

Section 4 : Operation of E.U.T. during tests

4.1 Operating modes

The EUT exercise program used during testing was designed exercise the various system components in a manner similar to typical use.

The sequence in used : * Receive mode (0 dBmV input / 25 dBmV input)
* AV input mode (1 Vp-p input / 5 Vp-p input)
* Playback mode

Operation : The EUT tested above operation mode
(Using a video tape with a typical TV signal recorded on it, if necessary.)

Just ification : The system was configured in typical fashion (as a customer would normally use it) for testing.

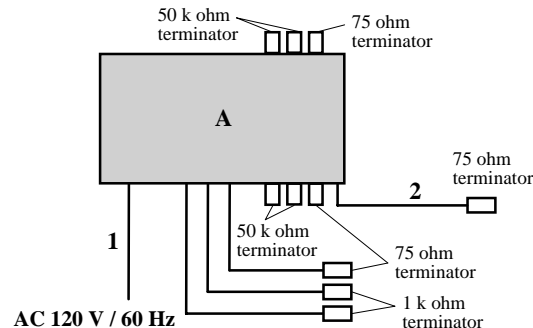
4.2 Configuration and peripherals

Front View



* Cabling was taken into consideration and test data was taken under worse case conditions.

Top View



* Cabling was taken into consideration and test data was taken under worse case conditions.

Description of EUT and support equipment

Sign	Item	Model number	Serial number	Manufacturer
A	Video Cassette Recorder	MVR4041	—	ORION ELECTRIC CO., LTD.
B	Remote Controller	—	—	ORION ELECTRIC CO., LTD.

Meshed column are represented

List of cable used

No.	Item	Length (m)	Shielding	Manufacturer
1	AC power cable	1.8	Unshielded	—
2	RF output cable	1.0	Shielded	Supplies accessory

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Section 5 : Summary of test results

5.1 Test results

No.	Item	Test procedure	Limits	Worst margin	Results
1	Conducted interference	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	250 uV	0.2 dB (0.45 MHz)	Passed (See note)
2	Radiated emission	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	30–88 MHz: 100 uV/m 88–216 MHz: 150 uV/m 216–960 MHz: 200 uV/m above 960 MHz: 500 uV/m	8.0 dB (466 MHz)	Passed
3	Antenna terminal voltage	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	2 nW (at 75 ohm)	12.3 dB (1249.3MHz)	Passed
4	RF output level	ANSI C63.4:1992 IEEE 213:1987	Video signal: 3000 uV Aural signal: 671 uV	2.2 dB (61.25 MHz)	Passed
	Spurious emission	IEEE 187:1990	94.8 uV	16.1 dB (221.7MHz)	Passed
5	Picture sensitivity	ANSI C63.4:1992 IEEE 213:1987 IEEE 187:1990	8 dB	–	Passed
6	Noise figure	FCC/OET MP:2:1986	14 dB	6.3 dB (507.25 MHz, 543.25 MHz, 579.25 MHz, 615.25 MHz, 651.25 MHz, 687.25 MHz)	Passed

A-PEX INTERNATIONAL hereby confirms that E.U.T., in the configuration tests, complies with the specifications FCC Part15 Subpart B.

*Note) The emission level of 0.45 MHz was over the limit with QP detection mode but this noise type is broad band noise so that has been reduced 13 dB for comparison to the limit. (EUT exercise mode: Receive + Rec., Desired signal 0 dBmV)

This inspection has been performed according to the section 15.107 (d). Measuring systems are satisfied to the requirements of section 15.107 (d) (1), (2).

5.2 Uncertainty

Conducted Emission Test (150 kHz – 30 MHz)

The measurement uncertainty (with a 95 % confidence level) for this test was ± 1.74 dB.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

Radiated Emission Test

Measurement distance of 3 m:

The measurement uncertainty (with a 95 % confidence level) for this test using Biconical antenna is ± 4.4 dB.

The measurement uncertainty (with a 95 % confidence level) for this test using Logperiodic antenna is ± 4.8 dB.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin, more than site margin.

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Antenna Terminal Voltage Test

The measurement uncertainty (with a 95 % confidence level) for this test was ± 3.48 dB.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

RF Output Level / Spurious Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was ± 3.48 dB.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

Peak Picture Sensitivity Test

The measurement uncertainty (with a 95% confidence level) for this test was ± 1.0 dB.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

Noise Figure Test

The measurement uncertainty (with a 95% confidence level) for this test was ± 1.0 dB.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

5.3 Test instruments

Please refer to the list of test instruments in Section 6.

5.4 Test location

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221-0031 JAPAN

TEL : +81-45-450-1515

FAX : +81-45-450-1534

Measurement items:

Conducted interference, Antenna terminal voltage, RF output level, Spurious emission, Peak picture sensitivity, Noise figure)

A-PEX International Co.,Ltd. Yokowa Laboratory

108 Yokowa-cho, Ise-shi, Mie, 516-1106 JAPAN

TEL : +81-596-39-1485

FAX : +81-596-39-0232

Measurement item:

Measurement of Radiated emission

5.5 Photographs of test set up

Please refer to Appendix 1.

5.6 Test data

Please refer to Appendix 2.

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Section 6 : Test instruments

Instruments	Manufacturer	Model No.	Control No.	Test Item	Calibration date	Validity
LISN	Schwarzbeck	NSLK8127	APLSN05	CE	January 18, 2001	January 17, 2002
Test receiver	Rohde & Schwarz	ESS	APRCV05	CE	June 04, 2001	June 03, 2002
TV generator	Leader	408	APTVG04	CE	Pre check	-
Coaxial cable	Fujikuwa	5D2W	APCBL02	CE	August 07, 2001	August 06, 2002
Noise figure indicator	Elena	ENF-2005	APNFM01	NF	September 27, 2000	September 26, 2002
Noise source	Elena	MC1100	APNFS01	NF	September 27, 2000	September 26, 2002
Signal generator	Rohde & Schwarz	SMY01	YTSSG02	PS	May 07, 2001	May 06, 2002
Oscillo scope	Tektronix	TDS410A	APOSC01	PS	April 27, 2001	April 26, 2002
Spectrum analyzer	Advantest	R3365	YTSPA01	AT	April 03, 2001	April 02, 2002
Matching pad	TME	ZT-204	APMAT04	AT	October 23, 2000	October 22, 2001
Matching pad	TME	ZT-130	APMAT05	AT	October 23, 2000	October 22, 2001
Pre amplifier	Anritsu	MH648A	APPRA01	AT	August 09, 2001	August 08, 2002
Pre amplifier	Hewlett Packard	8449B	APPRA05	AT	August 09, 2001	August 08, 2002
Coaxial cable	Fujikuwa	5D2W	APCBL06	AT	August 07, 2001	August 06, 2002
Coaxial cable	Fujikuwa	5D2W	APCBL07	AT	August 07, 2001	August 06, 2002

Instruments	Manufacturer	Model No.	Control No.	Test Item	Calibration date	Validity
Open test site	JSE	10 m	YOATS-01	RE	May 07, 2001	May 06, 2002
Yokowa No. 1 open Coaxial cable (0.01 – 1000 MHz)	A-Pex	CC-11, CC-12, CC-14, CC-15, CC-16, CC-17, SW-11, SW-12	CC-1ORC	RE	March 31, 2001	March 30, 2002
Pre amplifier	Anritsu	MH648A	AF-02	RE	March 31, 2001	March 30, 2002
Pre amplifier	H.P.	8449B	AF-04	RE	November 05, 2000	November 04, 2001
Attenuator	Anritsu	MP721B	AT-03	RE	March 31, 2001	March 30, 2002
Biconical antenna	Schwarzbeck	BBA9106	BA-01	RE	May 01, 2001	April 30, 2002
Logperiodic antenna	Schwarzbeck	UHALP9108-A	LA-05	RE	November 4, 2001	November 3, 2002
Spectrum analyzer	H.P.	8567A	SA-01	RE	March 31, 2001	March 30, 2002
Spectrum analyzer	Advantest	R3271	SA-05	RE	February 01, 2001	January 31, 2002
Test receiver	Rohde & Schwarz	ESVS30	TR-02	RE	April 12, 2001	April 11, 2002
Horn antenna	A.H Systems	SAS200/571	HA-01	RE	May 20, 2001	May 19, 2002

* The abbreviation in the test item column stands for:

CE: Conducted emission, RE: Radiated emission, AT:Antenna terminal voltage,
RF: RF output level / spurious emission, PS: Picture sensitivity, NF: Noise figure

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Section 7 : Conducted interference

7.1 Operation environment

The test was carried out in a screened room the size of 6 × 7 × 2.4 m.

Date: October 20, 2001
Temperature: 25.0 °C
Humidity: 49 %

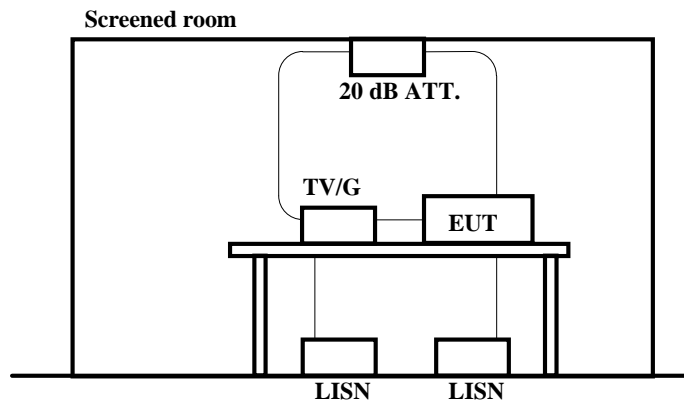
7.2 Test configuration

EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flush with rear of tabletop. All other surfaces of tabletop was at least 80 cm from any other grounded conducting surface. I/O cables and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, were individually connected through a LISN to the input power source. All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.

A drawing of the set up is shown in figure 1 and photographs in Appendix 1.

Figure 1. Conducted interference

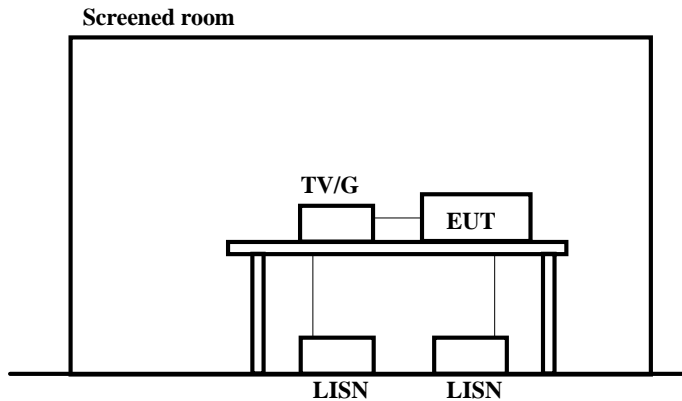
Receive + Rec. mode (0 dBmV input / 25 dBmV input)



Note:

RF in: TV signal generator connected
Front video in: 75 ohm terminated
Front audio in: 50 k ohm terminated
Rear video in: 75 ohm terminated
Rear audio in: 50 k ohm terminated
Rear video out: 75 ohm terminated with video cable
Rear audio out: 1 k ohm terminated with audio cable
RF output: 75 ohm terminated with RF output cable

AV input (LINE 1) + Rec. mode (1 Vp-p input / 5 Vp-p input)



Note:

RF in: 75 ohm terminated

Front video in: 75 ohm terminated

Front audio in: 50 k ohm terminated

Rear video in: Video generator connected

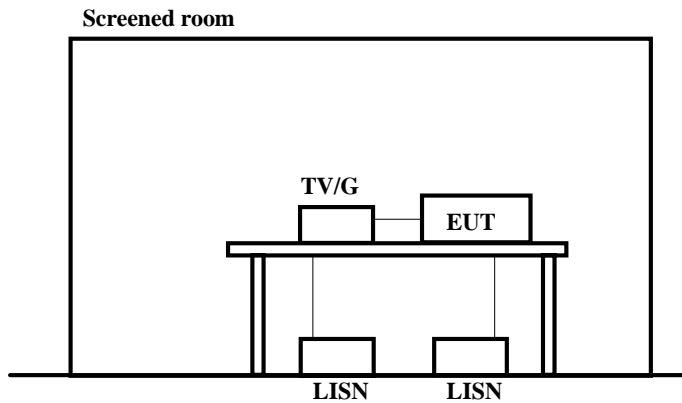
Rear audio in: 50 k ohm terminated

Rear video out: 75 ohm terminated with video cable

Rear audio out: 1 k ohm terminated with audio cable

RF output: 75 ohm terminated with RF output cable

AV input (LINE 2) + Rec. mode (1 Vp-p input / 5 Vp-p input)



Note:

RF in: 75 ohm terminated

Front video in: video signal generator connected

Front audio in: 50 k ohm terminated

Rear video in: 75 ohm terminated

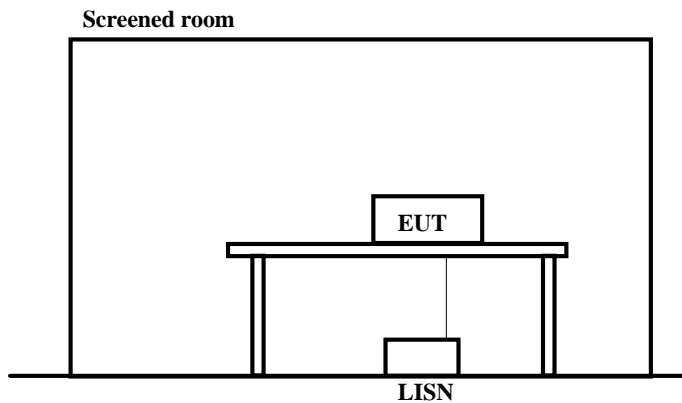
Rear audio in: 50 k ohm terminated

Rear video out: 75 ohm terminated with video cable

Rear audio out: 1 k ohm terminated with audio cable

RF output: 75 ohm terminated with RF output cable

Playback mode



Note:

RF in: 75 ohm terminated
Front video in: 75 ohm terminated
Front audio in: 50 k ohm terminated
Rear video in: 75 ohm terminated
Rear audio in: 1 k ohm terminated
Rear video out: 75 ohm terminated with video cable
Rear audio out: 1 k ohm terminated with audio cable
RF output: 75 ohm terminated with RF output cable

7.3 Test conditions

Frequency range : 0.45 MHz – 30 MHz
EUT position : Table top

7.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a screened room. The EUT was connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection has been performed. The measurements have been performed with a quasi-peak detector and if required, with an average detector.

The EUT was put into operation at receive mode, AV input mode and playback mode.

EUT and desired signal generator should connect through 20 dB attenuator.

The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : Quasi-Peak / Average
IF Bandwidth : 10 kHz / 10kHz

7.5 Test result

Passed

Please refer to summary of the test results in Appendix 2.

Test engineer : Hisayuki Kioka

Section 8 : Radiated emission

8.1 Operation environment

The test was carried out in a open area test site the size of 10 × 20 m.

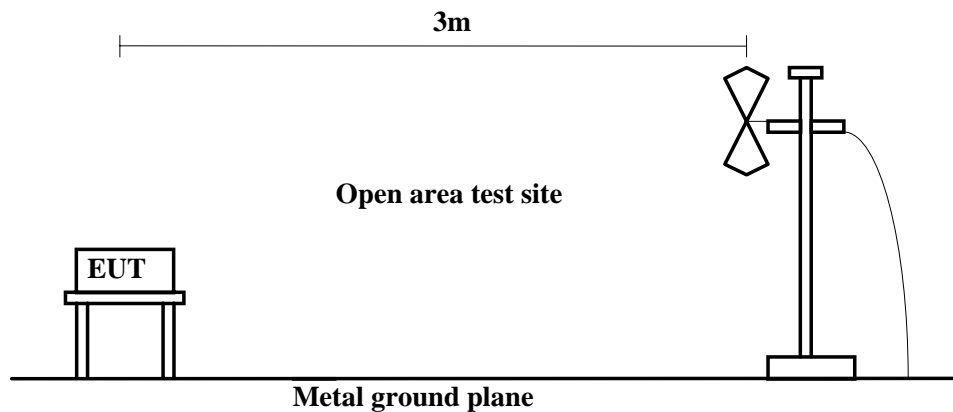
Date: October 18, 2001	Date: October 19, 2001
Temperature: 25.0 °C	Temperature: 23.0 °C
Humidity: 57 %	Humidity: 62 %

8.2 Test configuration

EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of EUT, including peripherals was aligned and flush with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged 40 cm height to the ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

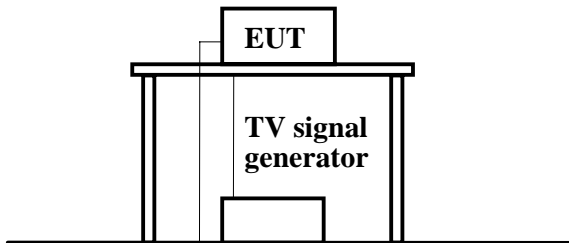
A drawing of the set up is shown in figure 2 and photographs in Appendix 1.

Figure 2. Radiated emission



Receive + Rec. mode (0 dBmV / 25 dBmV)

Open area test site

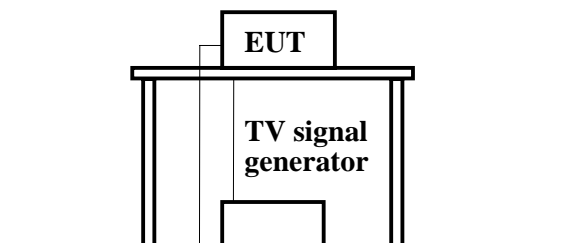


Note:

RF in: TV signal generator connected
Front or rear video in: 75 ohm terminated
Front or rear audio in: 50 k ohm terminated
Rear video out: 75 ohm terminated with video cable
Rear audio out: 1 k ohm terminated with audio cable
RF output: 75 ohm terminated with RF output cable

AV input (LINE 1) + Rec. mode (1 Vp-p input / 5 Vp-p input)

Open area test site

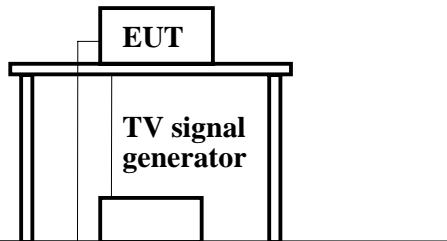


Note:

RF in: 75 ohm terminated
Front video in: 75 ohm terminated
Front audio in: 50 k ohm terminated
Rear video in: Video signal generator connected
Rear audio in: 50 k ohm terminated
Rear video out: 75 ohm terminated with video cable
Rear audio out: 1 k ohm terminated with audio cable
RF output: 75 ohm terminated with RF output cable

AV input (LINE 2) + Rec. mode (1 Vp-p input / 5 Vp-p input)

Open area test site



Note:

RF in: 75 ohm terminated

Front video in: Video signal generator connected

Front audio in: 50 k ohm terminated

Rear video in: 75 ohm terminated

Rear audio in: 50 k ohm terminated

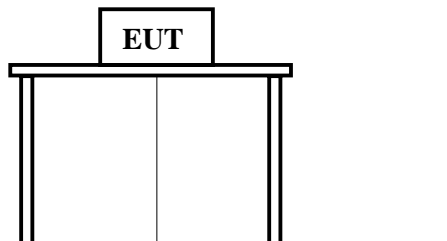
Rear video out: 75 ohm terminated with video cable

Rear audio out: 1 k ohm terminated with audio cable

RF output: 75 ohm terminated with RF output cable

Playback mode

Open area test site



Note:

RF in: 75 ohm terminated

Front or rear video in: 75 ohm terminated

Front or rear audio in: 50 k ohm terminated

Rear video out: 75 ohm terminated with video cable

Rear audio out: 1 k ohm terminated with video cable

RF output: 75 ohm terminated with RF output cable

8.3 Test conditions

Frequency range : 30 MHz – 2000 MHz
Test distance : 3 m
EUT position : Table top

8.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane and at a distance of 3 m.

Pre check measurements were performed within a screened room or used search coil for ambient noise at high-level, especially.

Measurements were performed with a quasi-peak detector.

The measuring antenna height was varied between 1 to 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization. The EUT was put into operation at receive mode, AV input mode and playback mode.

The radiated emission measurements were made with the following detector function of the test receiver.

Detector Type : QP (30-1000 MHz) / Ave. (1000-2000MHz)
IF Bandwidth : 120 kHz / 1 MHz

8.5 Test result

Passed

Please refer to summary of the test results in Appendix 2.

Test engineer : Hiroya Tabata
Sadahiko Tanaka

Section 9 : Antenna terminal voltage

9.1 Operation environment

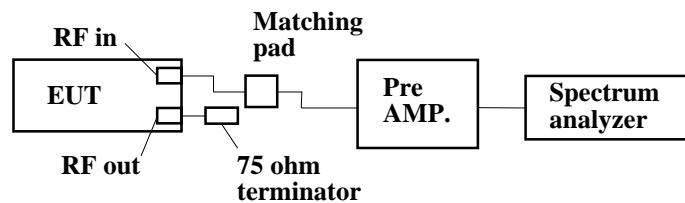
The test was carried out in a screened room the size of $6 \times 7 \times 2.4$ m.

Date: October 20, 2001
Temperature: 25.0 °C
Humidity: 49 %

9.2 Test configuration

The EUT was placed on a non-metallic platform 0.8 m above a reference ground plane.
A drawing of the set up is shown in figure 3 and photographs in Appendix 1.

Figure 3. Antenna terminal voltage



9.3 Test conditions

Frequency range : 30 MHz – 2000 MHz
EUT position : Table top

9.4 Test procedure

Connect EUT and spectrum analyzer through pre-amplifier. Set EUT to CH investigation mode then measure the voltage of local leakage from antenna terminal. Spectrum analyzer should be hold in maximum mode during the measurement. Measurement should be performed for TV receiver mode and CATV receiver mode.

Detector Type : Peak (30-1000 MHz)
IF Bandwidth : 120 kHz

9.5 Test result

Passed

Please refer to summary of the test results in Appendix 2.

Test engineer : Hisayuki Kioka

Section 10 : RF output level / spurious emission

10.1 Operation environment

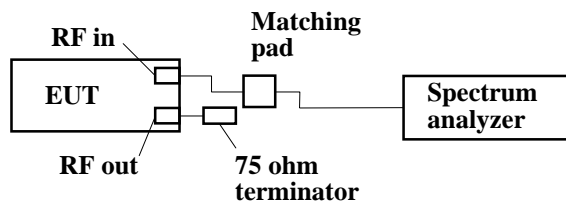
The test was carried out in a screened room the size of $6 \times 7 \times 2.4$ m.

Date: October 20, 2001
Temperature: 25.0 °C
Humidity: 49 %

10.2 Test configuration

The EUT was placed on a non-metallic platform 0.8 m above a reference ground plane.
A drawing of the set up is shown in figure 4 and photographs in Appendix 1.

Figure 4. RF output level



10.3 Test conditions

EUT position : Table top

10.4 Test procedure

EUT was connected spectrum analyzer through matching pad by accessory cable. RF channel selected 3 ch or 4 ch. Picture carrier, sound carrier and spurious levels are measured. Both sound carrier levels (upper and lower side bands) of modulator output are measured.

Detector Type : Peak
IF Bandwidth : 120 kHz

10.5 Test result

Passed

Please refer to summary of the test results in Appendix 2.

Test engineer : Hisayuki Kioka

Section 11 : Picture sensitivity

11.1 Operation environment

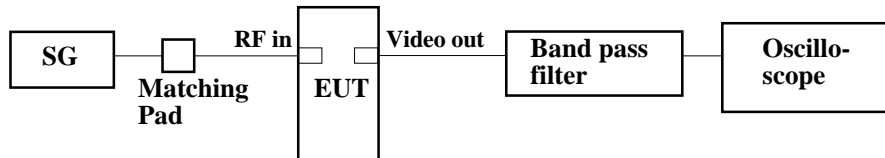
The test was carried out in a screened room the size of $6 \times 7 \times 2.4$ m.

Date: October 20, 2001
Temperature: 25.0 °C
Humidity: 49 %

11.2 Test configuration

The EUT was placed on a non-metallic platform 0.8 m above a reference ground plane.
A drawing of the set up is shown in figure 5 and photographs in Appendix 1.

Figure 5. Picture sensitivity



11.3 Test conditions

EUT position : Table top

11.4 Test procedure

Signal generator setup is as follows, (Example: 2ch – 55.25 MHz, AM, 1 kHz, 30 %)
The EUT was tuned to appropriate channel.
Output level of signal generator was adjusted to near the frequency output level of EUT output.
EUT output level was adjusted to maximum output level by frequency adjustment of signal generator.
Signal generator output level was adjusted to reference output level of EUT and output level had read.

11.5 Test result

Passed

Please refer to summary of the test results in Appendix 2.

Test engineer : Hisayuki Kioka

Section 12 : Noise figure

12.1 Operating environment

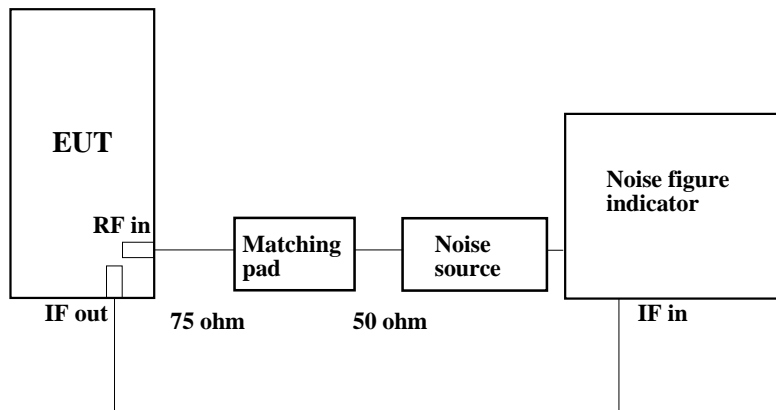
The test was carried out in a screened room the size of $6 \times 7 \times 2.4$ m.

Date: October 21, 2001
Temperature: 25.5 °C
Humidity: 44 %

12.2 Test configuration

The EUT was placed on a non-metallic table.
A drawing of the set up is shown in figure 6 and photographs in Appendix 1.

Figure 6. Noise figure



12.3 Test procedure

This test should be performed in a shielded room or an low noise environment. Connect solid state noise source to antenna input terminal of EUT. Connect IF output terminal of EUT to noise meter through ceramic condenser. Measurement has been performed for VHF,UHF and receiver range.

12.4 Test result

Passed

Please refer to summary of the test results in Appendix 2.

Test engineer : Hisayuki Kioka