

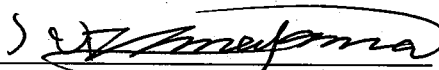
EMI TEST REPORT

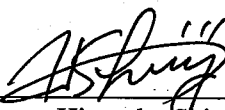
Test Report No. : 23BE0097-HO-1

Applicant : SONY Corporation
Type of Equipment : Digital Video Camera Recorder
Model No. : DCR-IP220
Test standard : FCCPart15 Subpart C
Section15.247
FCC ID : AK8DCRIP220
Test Result : Complied

1. This test report shall not be reproduced in full or partial, 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 report are traceable to the national or international standards.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : September 24 and 25, 2002

Tested by : 
Hiroka Umeyama
EMC Head Office Division

Approved by : 
Hironobu Shimoji
Group Leader of EMC Head Office Division

A-Pex International Co., Ltd. EMC Head Office Division.

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SECTION 1: Client information

Company name : SONY Corporation
Address : 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141- 0001 Japan
Telephone Number : +81-3-5769-5643
Facsimile Number : +81-3-5769-5963
Contact Person : Susumu Ishiwata

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

2.1 Identification of E.U.T.

Type of Equipment : Digital Video Camera Recorder
Model No. : DCR-IP220
Serial No. : 1320172
Rating : DC 7.2V
AC Adaptor AC 120V/60Hz
Country of Manufacture : Japan
Receipt Date of Sample : September 24, 2002
Condition of EUT : Production model

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2.2 Product Description

Model: DCR-IP220 which was referred to as the EUT in this report is a Digital Video Camera Recorder.
The specification is as following;

Equipment Type	:	Transceiver
Clock frequency used in EUT	:	67.5MHz
Frequency characteristics	:	from 2402MHz to 2480MHz
Number of Channel/ Channel spacing	:	79 channels/ 1MHz
Modulation	:	FSK (Frequency Shift Keying) and FHSS (Frequency Hopping Spread Spectrum)
Antenna Type	:	Wire-coupled Mono-pole Antenna (Integral)
Antenna Gain	:	0.25 dBi
ITU code	:	79M4F1D

*FCC Part 15.31 (e)

The host device DCR-IP220 provide the stable power supply (DC: 7.2V), and the Digital Video Camera Recorder complies power supply regulation.

*FCC Part 15.203 Antenna requirement

Digital Video Camera Recorder and its antenna comply with this requirement since they are built in host device DCR-IP220 when they are put up for sale and they are used with a particular antenna connector.

SECTION 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.247 Operation within the Band 902-928MHz, 2400-2483.5MHz and
5725-5850MHz

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	ANSI C63.4:2000	Section 15.207	-	Excluded*	N/A	N/A
2	Carrier Frequency Separation	ANSI C63.4:2000	Section15.247(a)(1)	Conducted	Excluded*	N/A	N/A
3	20dB Bandwidth	ANSI C63.4:2000	Section15.247(a)(1)	Conducted	N/A	N/A	Complied
4	Number of Hopping Frequency	ANSI C63.4:2000	Section15.247(a)(1)(iii)	Conducted	Excluded*	N/A	N/A
5	Dwell time	ANSI C63.4:2000	Section15.247(a)(1)(iii)	Conducted	Excluded*	N/A	N/A
6	Maximum Peak Output Power	ANSI C63.4:2000	Section15.247(b)(1)	Conducted	N/A	N/A	Complied
7	Band Edge Compliance	ANSI C63.4:2000	Section15.247(c)	Conducted	N/A	N/A	Complied
8	Spurious Emission	ANSI C63.4:2000	Section15.247(c)	Conducted/ Radiated	N/A	6.5dB 108.00MHz Vertical	Complied

*These tests were measured along with the change of IC version for EUT.

*Since test items marked as "Excluded" in the column "Deviation" are not affected in performances by the change of IC, they were not measured this time. Refer to 22IE0025-HO-2 in the original application.

*These tests were performed without any deviations from test procedure except for additions or exclusions.

*These tests were also referred to FCC Public Notice DA 00-705 "Guidance on Measurement for Frequency Hopping Spread Spectrum Systems".

3.3 Confirmation

A-Pex International hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C Section 15.247.

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3.4 Uncertainty

Spurious Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.5\text{dB}$.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}$.

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is $\pm 6.6\text{dB}$.

☐ 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.

20dB Bandwidth, Peak Output Power and Band Edge Test

The measurement uncertainty (with a 95% confidence level) for this test was $\pm 3.0\text{dB}$.

☐ 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.

3.5 Test Location

A-Pex International Co., Ltd. EMC Head Office Division. No.1semi Anechoic chamber.

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This semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on February 01, 2002. (Registration number: No. 1: 313583 Industry Canada: No.1: IC4247)

*NVLAP Lab. code: 200572-0

3.6 Test set up, Data of EMI and Test instruments

Refer to APPENDIX 1 to 3.

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SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

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

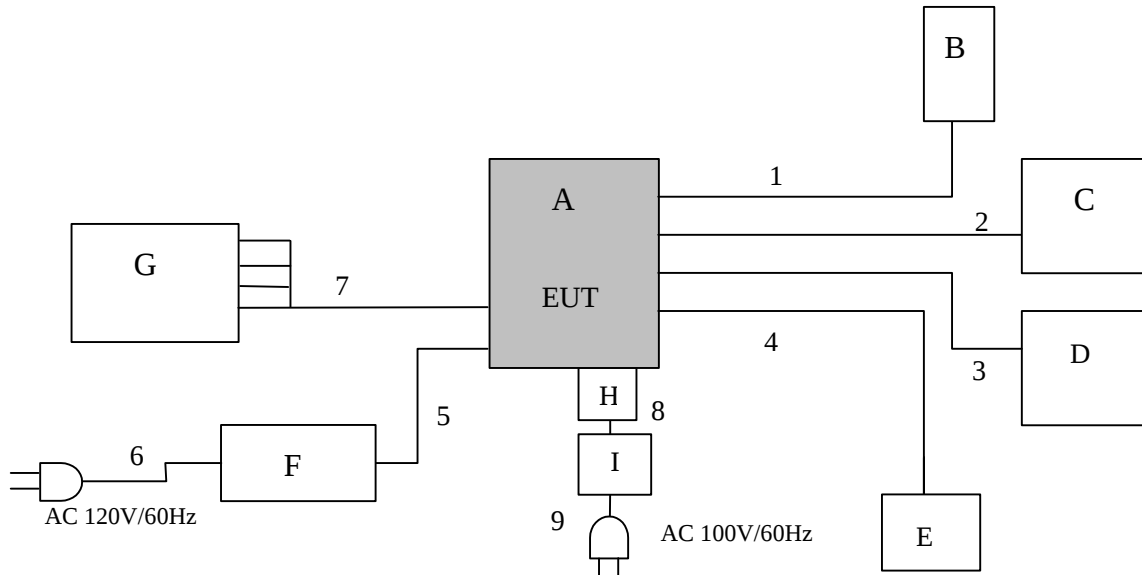
The sequence is used :

1. Transmitting mode (2402MHz)
2. Transmitting mode (2441MHz)
3. Transmitting mode (2480MHz)
4. Transmitting (Hopping on)
5. Inquiry

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

4.2 Configuration and peripherals

[Spurious Emission Test]



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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remark
A	Video Camera Recorder	DCR-IP220	1320172	SONY	AK8DCRIP220	EUT
B	Remote Controller	RM-95	-	SONY	-	-
C	Video Camera Recorder	DCR-IP7	1321649	SONY	-	-
D	PC	PP01L	TW-04E641-12800 -1AP-3747	DELL	DOC	-
E	Head Phone	MDR-Z900	-	SONY	-	-
F	AC Adaptor	AC-L20A	15119448	SONY	-	-
G	Digital Tape Recorder	GV-D1000	320081	SONY	-	-
H	jig	-	-	SONY		
I	DC Power Supply	PMC35-2A	13090501	KIKUSUI	-	-

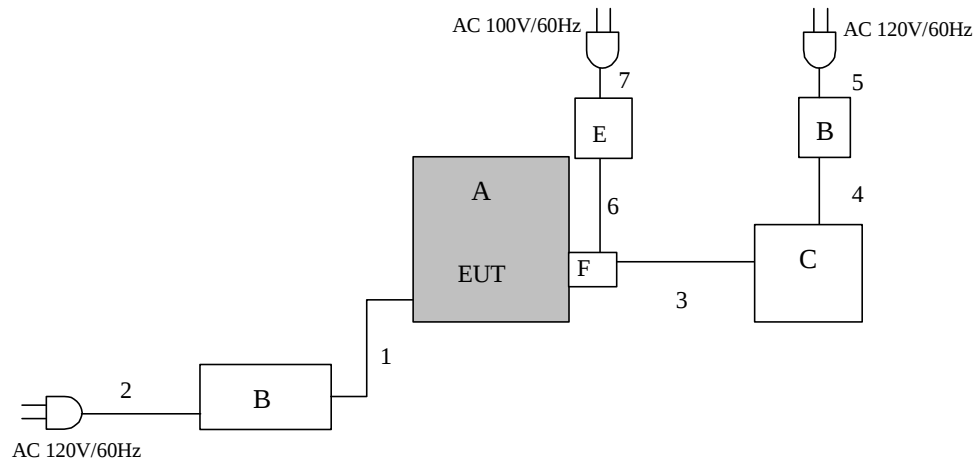
List of cables used

No.	Name	Length (m)	Shield	Backshell Material	Remark
1	Lanc cable	4.8	N	Polyvinyl chloride	-
2	DV Cable	1.0	Y	Polyvinyl chloride	-
3	USB Cable	1.0	Y	Polyvinyl chloride	-
4	Head Phone Cable	1.0	Y	Polyvinyl chloride	-
5	DC Cable	1.5	N	Polyvinyl chloride	-
6	AC Cable	1.5	N	Polyvinyl chloride	-
7	AV Multi Cable	1.5	Y	Polyvinyl chloride	-
8	DC Cable	1.6	N	Polyvinyl chloride	
9	AC Cable	1.8	N	Polyvinyl chloride	

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[20dB Bandwidth, Peak Output Power and Band Edge Test]



* Since conducted measurements are much more precise in consideration of the declared antenna assembly gain, although the EUT uses an integral antenna, a suitable antenna port was prepared for conducted measurements by the manufacturer.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remark
A	Video Camera Recorder	DCR-IP220	1320172	SONY	AK8DCRIP220	EUT
B	AC Adaptor	AC-L20A	15119448	SONY	-	-
C	PC	PCG-5414	283200001113711	SONY	-	-
D	AC Adaptor	PCG-AC19V2	0102A0444167A	SONY	-	-
E	DC Power Supply	PMC35-2A	13090501	KIKUSUI	-	-
F	jig	-	-	SONY	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material	Remark
1	DC Cable	1.5	N	Polyvinyl chloride	
2	AC Cable	1.5	N	Polyvinyl chloride	
3	RS232 Cable	2.0	Y	Polyvinyl chloride	-
4	DC Cable	1.8	N	Polyvinyl chloride	-
5	AC Cable	0.8	N	Polyvinyl chloride	-
6	DC Cable	1.6	N	Polyvinyl chloride	-
7	AC Cable	1.8	N	Polyvinyl chloride	-

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SECTION 5: 20dB Bandwidth , Section 15.247(a)(1)

Test Procedure

The 20dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-01, MCC-05

SECTION 6: Maximum Peak Output Power, Section 15.247(b)(1)

Test Procedure

The Maximum Peak Output Power was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-01, MCC-05

SECTION 7: Band Edge Compliance, Section 15.247(c)

Test Procedure

The Band Edge Compliance was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-01, MCC-05

SECTION 8: Spurious Emission , Section 15.247(c)

[Conducted]

Test Procedure

The Spurious Emission (Conducted) was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-01, MCC-05

[Radiated]

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The Radiated Electric Field Strength intensity has been measured in No.1 semi anechoic chamber (19.2x11.2x7.7m) with a ground plane and at a distance of 3m.

The measuring antenna height was varied between 1 to 4m 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.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-01, MCC-01, MCC-05, MCC-06, MHA-01, MHA-05, MPA-01, MPA-02
MBA-01, MLA-01, MAT-06, MCC-11, MBF-01

APPENDIX 1: Photographs of test setup

Page 13 : Spurious Emission Test

Page 14 : 20dB Bandwidth, Peak Output Power and Band Edge Test

APPENDIX 2: Data of EMI test

Page 15-17 : 20dB Bandwidth

Page 18-20 : Maximum Peak Output Power

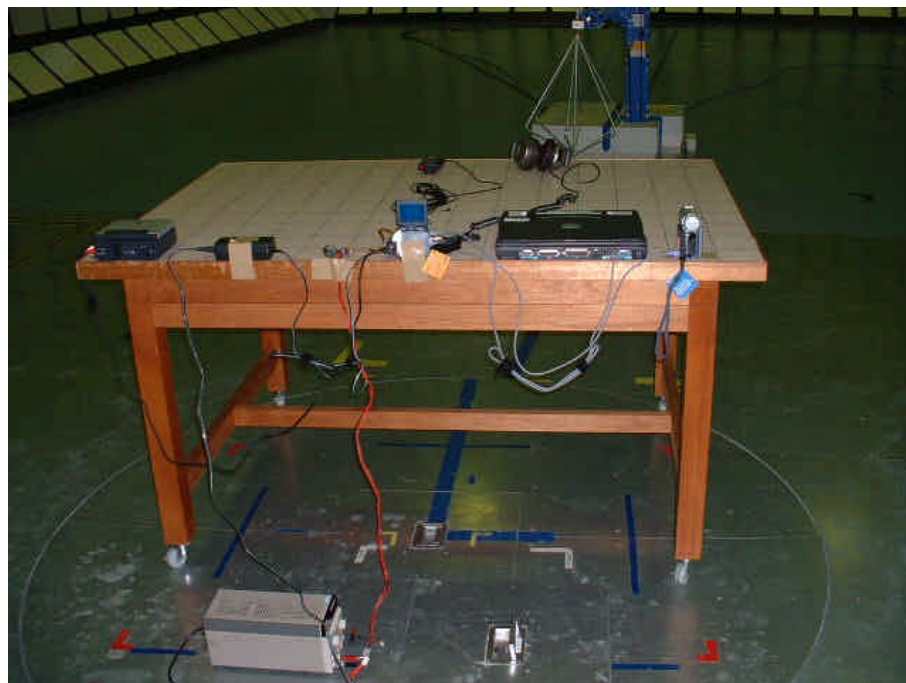
Page 21-23 : Band Edge Compliance

Page 24-53 : Spurious Emission

APPENDIX 3: Test instruments

Page 54 : Test instruments

APPENDIX 1: Photographs of test setup
Spurious Emission Test



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20dB Bandwidth, Peak Output Power Band Edge Test



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