

EMI TEST REPORT

Test Report No. : 22IE0025-HO-2


Applicant : SONY Corporation
Type of Equipment : Digital Video Camera Recorder
Model No. : DCR-IP220
Test standard : FCCPart15 Subpart C
Section15.207, 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 : June 4,5,6,7, 10 and 12, 2002

Issued date : June 24, 2002

Tested by : 
Hiroka Umeyama

Approved by : 
Tetsuya Hashimoto
Site Manager of EMC Head Office Division

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MF060b(22.05.01)

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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. : 95 and 96
Rating : DC 7.2V
AC Adaptor AC 120V/60Hz
Country of Manufacture : Japan
Receipt Date of Sample : June 3, 2002
Condition of EUT : Engineering prototype

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2.2 Product Description

Model: DCR-IP220 which was referred to as the EUT in this report is the 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 15.207 Conducted Emissions
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	-	N/A	18.0dB 11.2986MHz, L1	Complied
2	Carrier Frequency Separation	ANSI C63.4:2000	Section15.247(a)(1)	Conducted	N/A	-	Complied
3	20dB Bandwidth	ANSI C63.4:2000	Section15.247(a)(1)(ii)	Conducted	N/A	-	Complied
4	Number of Hopping Frequency	ANSI C63.4:2000	Section15.247(a)(1)(ii)	Conducted	N/A	-	Complied
5	Dwell time	ANSI C63.4:2000	Section15.247(a)(1)(ii)	Conducted	N/A	-	Complied
6	Maximum Peak Output Power	ANSI C63.4:2000	Section15.247(b)(1)	Conducted/ Radiated	N/A	-	Complied
7	Band Edge Compliance	ANSI C63.4:2000	Section15.247(c)	Conducted	N/A	-	Complied
8	Spurious Emission	ANSI C63.4:2000	Section15.247(c)	Conducted/ Radiated	N/A	5.8dB 135.0MHz Vertical	Complied

3.3 Additions to Standards

No addition, deviation or exclusion has been made from standards.

3.4 Confirmation

A-PEX INTERNATIONAL hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C Section 15.207 and 247.

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3.5 Uncertainty

Conducted Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was $\pm 1.3\text{dB}$.

- ☐ 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, more than the site margin.

Peak Output Power (Radiated) and 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.

Carrier Frequency Separation, 20dB Bandwidth, Number of Hopping Frequency, Dwell Time, Peak Output Power (Conducted) 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.

3.6 Test Location

A-PEX International Co., Ltd. EMC Head Office Division. No.1 and No.2 semi Anechoic chamber and No.3 Measurement room.

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This site has been fully described in a report submitted to FCC office. No. 1 site listed on February, 2002 and No. 2 site on June. (Registration number: No. 1: 313583, No.2: 846015 Industry Canada: No.1: IC4247, No2. :IC4247-2.)

*NVLAP Lab. code: 200572-0

3.7 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.

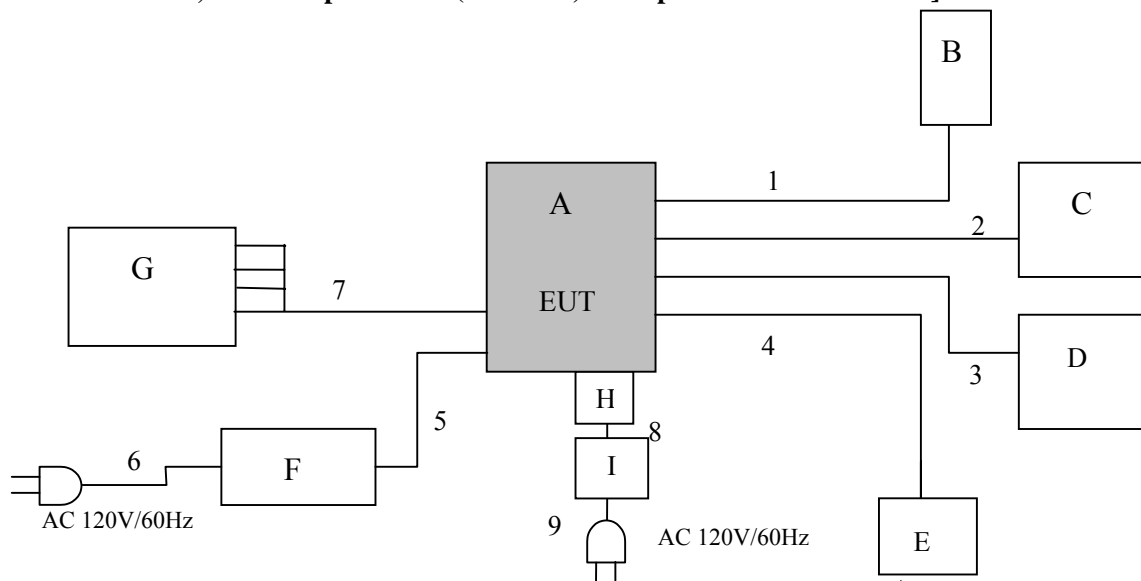
The operating mode/system was as follows:

- Operation mode :
1. Transmitting mode (2402MHz)
 2. Transmitting mode (2441MHz)
 3. Transmitting mode (2480MHz)
 4. Transmitting (Hopping on)
 5. Inquiry
 6. Loopback mode

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

4.2 Configuration and peripherals

[Conducted Emission, Peak Output Power (Radiated) and 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	95	SONY	AK8DCRIP220	EUT
B	Remote Controller	RM-95	-	SONY	-	-
C	Video Camera Recorder	DCR-IP5	1940322	SONY	-	-
D	PC	PCG-5414	283200001113711	SONY	-	-
E	Head Phone	MDR-Z900	-	SONY	-	-
F	AC Adaptor	AC-L20A	35926862	SONY	-	-
G	Digital Tape Recorder	D300E	600114	SONY	-	-
H	jig	-	-	SONY		
I	DC Power Supply	PMC35-2A	13090501	KIKUSUI	-	-

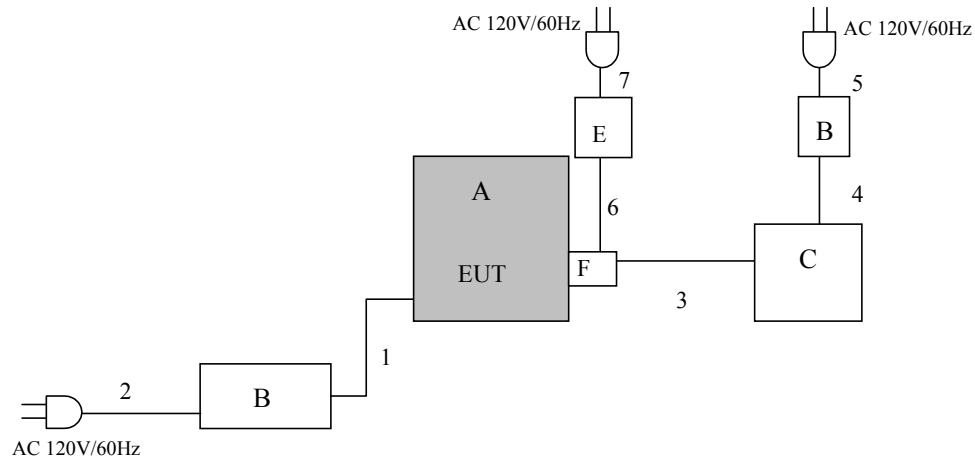
List of cables used

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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[Carrier Frequency Separation, 20dB Bandwidth, Number of Hopping Frequency, Dwell Time, Peak Output Power (Conducted) 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	96	SONY	AK8DCRIP220	EUT
B	AC Adaptor	AC-L20A	-	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: Conducted Emission, Section 15.207

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm 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 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a reference ground plane 4.0 x 4.0m in a No.2 semi Anechoic Chamber.

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 CISPR quasi-peak detector (IF BW 9 kHz).

Measurement range: 0.15-30MHz

Test data : APPENDIX 2

Test result : Pass

Test instruments : MTR-02, MSA-02, MCC-13, MLS-05, MLS-06, MTA-01

SECTION 6: Carrier Frequency Separation , Section15.247(a)(1)

Test Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2

Test result : Pass

Test instruments : MSA-02, MCC-04

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SECTION 7: 20dB Bandwidth, Section 15.247(a)(1)(ii)

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-04

SECTION 8: Number of Hopping Frequency, Section 15.247(a)(1)(ii)

Test Procedure

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MSA-02, MTR-01, MCC-04

SECTION 9: Dwell time, Section 15.247(a)(1)(ii)

Test Procedure

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-01, MCC-04

SECTION 10: Maximum Peak Output Power, Section 15.247(b)(1)

[Conducted]

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-04

[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 at the 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-04, MCC-06, MHA-06, MPA-01

SECTION 11: 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-04

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SECTION 12: 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-04

[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-04, MCC-06, MHA-01, MHA-06, MPA-01, MPA-02
MBA-01, MLA-01, MAT-06, MCC-11, MBF-01, MBF-02, MBF-03

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APPENDIX 1: Photographs of test setup

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Page 16	: Peak Output Power (Radiated) and Spurious Emission Test
Page 17	: Carrier Frequency Separation, 20dB Bandwidth, Number of Hopping Frequency, Dwell Time, Peak Output Power (Conducted) and Band Edge Test

APPENDIX 2: Data of EMI test

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Page 23-25	: Carrier Frequency Separation
Page 26-28	: 20dB Bandwidth
Page 29-31	: Number of Hopping Frequency
Page 32-41	: Dwell time
Page 42-48	: Maximum Peak Output Power
Page 49-51	: Band Edge Compliance
Page 52-81	: Spurious Emission

APPENDIX 3: Test instruments

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APPENDIX 1: Photographs of test setup

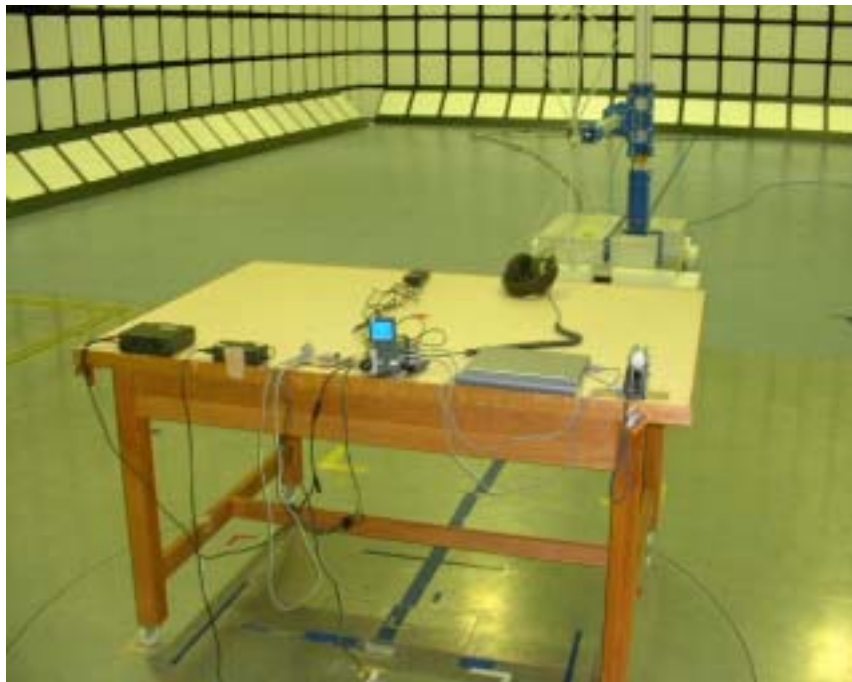
Conducted emission



Peak Output Power (Radiated) and Spurious Emission Test

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**Carrier Frequency Separation, 20dB Bandwidth, Number of Hopping Frequency, Dwell Time,
Peak Output Power (Conducted) and Band Edge Test**

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