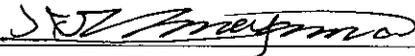

EMI TEST REPORT

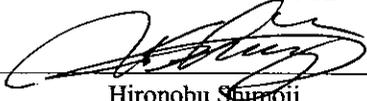
Test Report No. : 23BE0019-HO-10

Applicant : Sony Corporation
Type of Equipment : Digital Photo Printer
Model No. : UP-DX100
Test standard : FCC Part 15 Subpart C Section 15.207, Section 15.247
FCC ID : AK8UPDX100
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 : January 8, 9, 10 and 14, 2003

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
Brand name : SONY
Address : 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141-0001 JAPAN
Telephone Number : +81-46-230-5603
Facsimile Number : +81-46-230-6354
Contact Person : Kazuo Aihara

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

2.1 Identification of E.U.T.

Type of Equipment : Digital Photo Printer
Model No. : UP-DX100
Serial No. : 30004, 30011
Rating : AC 100-240V, 50/60Hz
Country of Manufacture : Japan
Receipt Date of Sample : January 6, 2003
Condition of EUT : Production prototype

2.2 Product Description

Model: UP-DX100 (referred to as the EUT in this report) is the Digital Photo Printer.

The clock frequency used in EUT is 117.9648MHz (CPU), 33MHz (ASIC) and 48MHz (USB).

Equipment Type : Transceiver
Frequency characteristics : from 2400 MHz to 2483.5 MHz
Number of channels and spacing : 79 channels / 1MHz
Modulation : GFSK
Antenna Gain : Max: 3.56dBi, AVG: -3.40dBi
Antenna Type : External Ground, Ceramic chip, $\lambda/4$, YCE-5226 (Yokowo)
Temperature Range : 5 degree C. to 35 degree C.
ITU code : F1D

*FCC Part 15.31(e) Verification of Input Power: UP-DX100: Refer to Appendix 3.

*FCC Part 15.203 Antenna requirement

The antenna built in the UP-DX100 is a chip antenna and is permanently mounted by soldering on a printed electronic circuit board in UP-DX100. It is impossible for end users to replace it, because a special tool is necessary for removal of the antenna.

SECTION 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C Section 15.207 and Section15.247
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted emission limits; general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,
5725-5850MHz

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	ANSI C63.4:2001	Section 15.207	N/A	N/A	8.6dB 0.1808MHz, L1	Complied
2	Carrier Frequency Separation	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	N/A	Complied
3	20dB Bandwidth	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	N/A	Complied
4	Number of Hopping Frequency	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	N/A	Complied
5	Dwell time	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	N/A	Complied
6	Maximum Peak Output Power	ANSI C63.4:2001	Section15.247(b)(1)	Conducted	N/A	N/A	Complied
7	Band Edge Compliance	ANSI C63.4:2001	Section15.247(c)	Conducted	N/A	N/A	Complied
8	Spurious Emission	ANSI C63.4:2001	Section15.247(c)	Conducted / Radiated	N/A	4.5dB 4804MHz Horizontal	Complied

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

3.3 Additions to standards

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

3.4 Confirmation

A-Pex International Co., Ltd. hereby confirms that E.U.T. , in the configuration tested, complies with the specifications FCC Part15 Subpart C Section 15.207 and Section 15.247.

3.5 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test was ± 1.3 dB.

The data listed in this test report has enough margin, more than the site margin.

Spurious Emission(Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ± 6.6 dB.

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

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test was ± 3.0 dB.

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 semi anechoic chamber, 19.2 x 11.2 x 7.7m

No.2 semi anechoic chamber 7.5 x 5.8 x 5.2 m.

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This site has been fully described in a report submitted to FCC office, and listed on February 01, 2002/June 05, 2002 (Registration number: 313583/846015)

*NVLAP Lab. Code: 200572-0

3.7 Test setup, Data of EMI and Test instruments

Refer to Appendix 1 to 3.

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

4.1 Operating Modes

The EUT exercise program used during radiated 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 : Transmitting

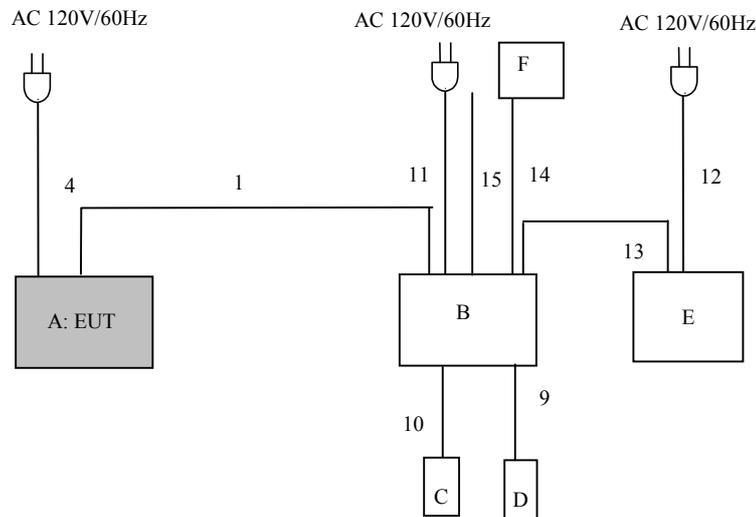
1. Transmitting mode(2402 MHz)
2. Transmitting mode(2441 MHz)
3. Transmitting mode(2480MHz)
4. Transmitting mode(Hopping on)
5. Inquiry

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

4.2 Configuration and peripherals

[Conducted emission and spurious Emission (Radiated)]

UP-DX100



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

[Other tests except Conducted Emission and Spurious Emission (Radiated)]

UP-DX100

AC 120V/60Hz



Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remark
A	Digital Photo Printer	UP-DX100	30004, 30011	SONY	AK8UPDX100	EUT
B	PC	PCV-J21MBP	0003016	SONY	-	-
C	Keyboard	PCVA-KB1P/JA	0140216	SONY	-	-
D	Mouse	X06-8477	4449049	DELL	DoC	-
E	CRT	PCVD-A201	169-0034466	SONY	-	-
F	Loopback Jig	-	-	-	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material	Remark
1	USB Cable	1.0	Y	Polyvinyl chloride	-
4	AC Cable	2.0	N	Polyvinyl chloride	
9	Mouse Cable	1.7	N	Polyvinyl chloride	-
10	Keyboard Cable	1.8	Y	Polyvinyl chloride	
11	AC Cable	2.0	N	Polyvinyl chloride	
12	AC Cable	2.0	N	Polyvinyl chloride	
13	RGB Cable	1.4	Y	Polyvinyl chloride	
14	RS232C Cable	1.5	Y	Polyvinyl chloride	
15	Printer Cable	2.0	Y	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-06, MLS-07, MTA-01, MPL-01**

SECTION 6: Carrier Frequency Separation , Section 15.247(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 : **MTR-01, MCC-05**

SECTION 7: 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 8: Number of Hopping Frequency, Section 15.247(a)(1)(iii)

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 : MTR-01, MCC-05

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

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-05

SECTION 10: 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 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-05

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-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.2 semi anechoic chamber (7.5x5.8x5.2m) 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-12, MCC-05, MCC-06, MHA-05, MPA-01
MBA-03, MLA-03, MPA-04, MAT-07, MCC-11
MBF-01, MHA-01, MSA-02, MTR-02

APPENDIX 1: Photographs of test setup

- Page 13 : Conducted Emission (UP-DX100)
Page 14 : Spurious Emission (Radiated) (UP-DX100)
Page 15 : Other tests except Conducted emission and Spurious Emission (Radiated) (UP-DX100)

APPENDIX 2: Test instruments

- Page 16 : Test instruments

APPENDIX 3: Data of EMI test

- Page 17-20 : Conducted Emission
Page 21-23 : Carrier Frequency Separation
Page 24-26 : 20dB Bandwidth
Page 27-30 : Number of Hopping Frequency
Page 31-35 : Dwell time
Page 36-38 : Maximum Peak Output Power
Page 39-41 : Band Edge Compliance
Page 42-53 : Spurious Emission
Page 54-56 : Variation of Input Power

APPENDIX 1: Photographs of test setup

Conducted emission (UP-DX100)



Spurious Emission (Radiated) (UP-DX100)



Other tests except Conducted emission and Spurious Emission (Radiated) (UP-DX100)



Test Report No : 23BE0019-HO-10

APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE / CE	2002/11/01 * 12
APANT03	Horn Antenna	A.H.Systems	SAS-200/571	RE	2001/09/19 * 36
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE / CE	2002/04/12 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2002/12/24 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/05/02 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	MCC-13-01(3D -2W-5m) MCC-13-02(3D -2W-7m) MCC-13-03(5D -2W-5m) MCC-12-05(RF SW) MCC-12-03(5D -2W-0.8m) MCC-12-06 (RF SW) MCC-13-04(5D -2W-1m)	CE	2002/05/09 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2002/05/02 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2002/03/13 * 12
MSA-02	Spectrum Analyzer	Advantest	R3265A	RE/CE	2002/09/20 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE/CE	2002/10/11 * 12
MBF-01	SHF Bandpass Filter	M-City	5GHz BPF	RE	2002/04/30 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2003/01/14 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2002/02/09 * 12
MCC-06	Microwave Cable	Storm	421-011	RE	2003/01/14 * 12
MCC-11	Microwave coaxial cable	Suhner	SUCOFLEX 104	RE	2002/03/27 * 12
MHA-01	Horn Antenna	EMCO	3160-09	RE	2003/01/11 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE(EUT)	2002/03/19 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	CE	2002/03/19 * 12
MPL-01	Pulse Limiter	Rohde & Schwarz	ESH3Z2	CE	2003/01/07 * 12
MTA-01	Termination	TME	CT-01	CE	2003/01/07 * 12
MCC-05	Microwave Cable	Storm	421-011	RE	2003/01/14 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	MCC-12-01(8D -2W-15m) MCC-12-02(5D -2W-0.7m) MCC-12-05(RF SW) MCC-12-03(5D -2W-0.8m) MCC-12-06(RF SW) MCC-12-04(5D -2W-1m)	RE	2002/05/09 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2003/01/11 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

CE: Conducted emission,

RE: Radiated emission,