RADIO TEST REPORT

Test Report No. : 31EE0296-HO-04-A-R1

Applicant	:	**SINFONIA TECHNOLOGY CO., LTD.**
Type of Equipment	:	**Digital Photo Printer**
Model No.	:	**DP-1045-5**
Test standard	:	**FCC Part 15 Subpart C: 2011**
FCC ID	:	**ZQUDP-1045-5**
Test Result	:	**Complied**

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6. This report is a revised version of 31EE0296-HO-04-A. 31EE0296-HO-04-A is replaced with this report.

Date of test: June 26 and July 20, 2011

Representative test engineer:
Tomotaka Sasagawa
Engineer of WiSE Japan,
UL Verification Service

Approved by:
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Leader of WiSE Japan,
UL Verification Service

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http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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SECTION 1: Customer information

Company Name	:	SINFONIA TECHNOLOGY CO., LTD.
Address	:	100 Takegahana-cho, Ise-shi, Mie-ken, 516-8550 JAPAN
Telephone Number	:	81-596-36-1286
Facsimile Number	:	81-596-36-3884
Contact Person	:	Tsutomu Inagaki

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

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Photo Printer
Model No.	:	DP-1045-5
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	AC 100-240V
Receipt Date of Sample	:	June 14, 2011
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system	:	External 24 MHz: Internal ARM 300 MHz, DSP 300 MHz, DDR 126 MHz USB: Communicate with PC at maximum 480 MHz External 50 MHz: Internal FPGA 50 MHz, 100 MHz External 13.56 MHz: Internal RFID 13.56 MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	13.56MHz
Modulation	:	ASK
Power Supply (radio part input)	:	DC 3.3V
Antenna type	:	Pattern Antenna

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2011, final revised on July 8, 2011 and effective August 8, 2011
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.225 : Operation within the band 13.110-14.010MHz

*The revision on July 8, 2011 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	[QP] 10.5dB 13.56000MHz, L [AV] 9.2dB 0.50326MHz, L	Complied	-
	<IC>RSS-Gen 7.2.4	<IC>RSS-Gen 7.2.4			
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	53.4dB 13.56000MHz, QP, 90deg.	Complied	Radiated
	<IC> RSS-Gen 4.8, 4.11	<IC>RSS-210 A2.6			
Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	24.6dB 13.11000MHz, QP, 90deg.	Complied	Radiated
	<IC>RSS-Gen 4.9, 4.11	<IC> RSS-210 A2.6			
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.215(c)	See data	Complied	Radiated
	<IC> -	<IC> -			
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209, Section 15.225 (d)	3.9dB 649.999MHz, Horizontal, QP	Complied	Radiated
	<IC>RSS-Gen 4.9, 4.11	<IC>RSS-210 A2.6			
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.225(e)	See data	Complied	Radiated
	<IC>RSS-Gen 4.7	<IC> RSS-210 A2.6			
Note: UL Japan, Inc.'s EMI Work Procedures No.: 13-EM-W0420 and 13-EM-W0422					

FCC 15.31 (e)
This EUT provides stable voltage (DC 3.3V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	N/A	-	Radiated

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.1dB
No.2	3.3dB
No.3	3.7dB
No.4	3.2dB

Test room (semi-anechoic chamber)	**Radiated emission (10m*)(±dB)**		
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz
No.1	3.3dB	5.2dB	5.2dB
No.2	-	-	-
No.3	-	-	-
No.4	-	-	-

*10m = Measurement distance

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	3.5dB	5.1dB	5.2dB	4.8dB	5.1dB	4.4dB	4.3dB
No.2	4.0dB	5.1dB	5.2dB	4.8dB	5.0dB	4.3dB	4.2dB
No.3	4.2dB	4.7dB	5.2dB	4.8dB	5.0dB	4.5dB	4.2dB
No.4	4.0dB	5.0dB	5.1dB	4.8dB	5.0dB	5.1dB	4.2dB

3m/1m/0.5m = Measurement distance

Frequency counter (±)	
Normal condition	Extreme condition
7×10^{-6}	9×10^{-6}

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

Radiated emission test (3m and 10m)
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test set up, Data of EMI, and Test instruments

Refer to APPENDIX .

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

4.1 Operating Modes

The mode is used :

Mode	Remarks
Transmitting (Tx and Rx) mode	Without Tag
Transmitting (Tx) mode	Modulation off (Mod off)
The EUT was operated in a manner similar to typical use during the tests. The EUT Transmits and Receives at the same time and there is no receiving mode.	
*Power Setting: same as production model Software: E0211800-0112-D5 Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

Test Item	Operating mode
Conducted emission	Transmitting (Tx and Rx) without Tag
Electric Field Strength of Fundamental Emission	Transmitting (Tx and Rx) without Tag
Spectrum Mask	Transmitting (Tx and Rx) without Tag
20dB Bandwidth	Transmitting (Tx and Rx) without Tag
Electric Field Strength of Spurious Emission	Transmitting (Tx and Rx) without Tag
Frequency Tolerance	Tx Mod off

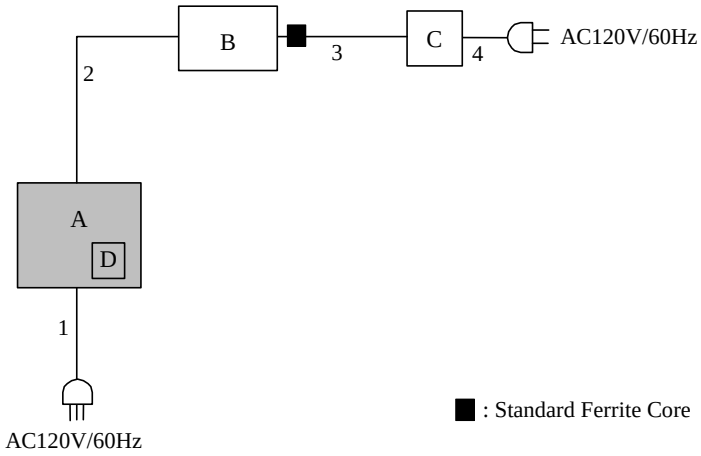
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

Frequency Tolerance:

Temperature : -30deg.C to +50deg.C Step 10deg.C
Voltage : Normal Voltage AC 120V (Rating: AC 100 - 240V)
Maximum Voltage AC 276V(AC 240V +15%),
Minimum Voltage AC 85V (AC 100V -15%)
*This EUT provides stable voltage (DC 3.3V) constantly to RF Part regardless of input voltage.

4.2 Configuration and peripherals

Conducted emission test



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

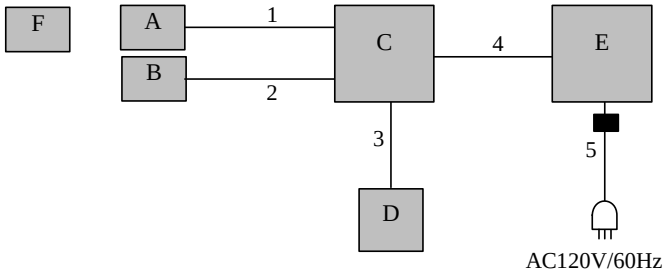
Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Photo Printer	DP-1045-5	E3-001	SINFONIA TECHNOLOGY CO., LTD.	EUT
B	Laptop PC	7661-CB9	L3-R205507/12	IBM	-
C	AC Adapter	92P1213	11S92P1213Z1ZB	IBM	-
D	Tag	-	-	-	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	3.0	Unshielded	Unshielded	-
2	USB Cable	1.5	Shielded	Shielded	-
3	DC Cable	1.8	Unshielded	Unshielded	-
4	AC Cable	0.8	Unshielded	Unshielded	-

Other tests except for Conducted emission test



* Cabling and setup were taken into consideration and test data was taken under worse case conditions.
* Radio parts were taken out because they were put in the chamber at the Frequency Tolerance test and put on the table at the Radiated emission test.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Antenna L	HSSV22-ANT-F	80-D00021-1A	SINFONIA TECHNOLOGY CO., LTD.	EUT
B	Antenna R	HSSV22-ANT-F	80-D00029-1A	SINFONIA TECHNOLOGY CO., LTD.	EUT
C	PCB	160-90-01684-051-ES	80-D00003-3A	SINFONIA TECHNOLOGY CO., LTD.	EUT
D	PCB	160-90-01613-ES	81-D00757-01A	SINFONIA TECHNOLOGY CO., LTD.	EUT
E	Power Supply Unit	070-88-00009-ES	00412G	SINFONIA TECHNOLOGY CO., LTD.	EUT
F	Tag	-	-	SINFONIA TECHNOLOGY CO., LTD.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Antenna Cable	0.9	Shielded	Shielded	-
2	Antenna Cable	1.2	Shielded	Shielded	-
3	Signal Cable	1.0	Unshielded	Unshielded	-
4	DC Cable	1.0	Unshielded	Unshielded	-
5	AC Cable	1.8	Unshielded	Unshielded	-

SECTION 5: Conducted emission

Test Procedure and conditions

EUT was placed on a carpet for insulation above the reference 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.
EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O 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. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector : QP and AV
Measurement range : 0.15-30MHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Radiated emission (Fundamental , Spurious Emission and Spectrum Mask)

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical (angle of loop antenna: 0deg., 45deg., 90deg., and 135 deg.) and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz	Above 1GHz	
Instrument used	Test Receiver					Spectrum Analyzer	
Detector	PK/AV	QP	PK/AV	QP	QP	PK	AV
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT and Antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

This EUT has two transmitting modes which tag is put close to the EUT or not.
The worst case was confirmed with and without Tag, as a result, the test without Tag was the worst case. Therefore the test without Tag was performed only.

Measurement range : **0.09M-1GHz**
Test data : **APPENDIX**
Test result : **Pass**

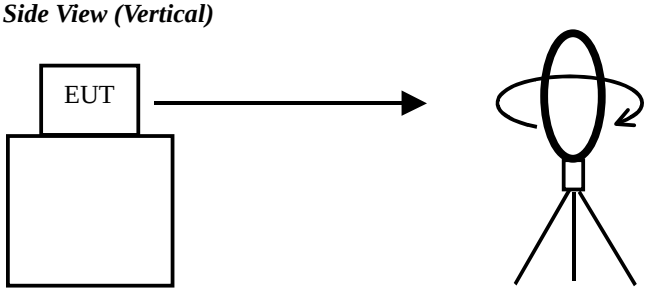
SECTION 7: Other test

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	100kHz	10kHz	30kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Sample	Clear Write	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter

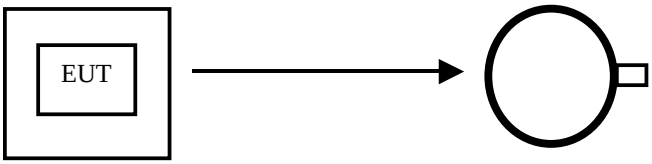
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

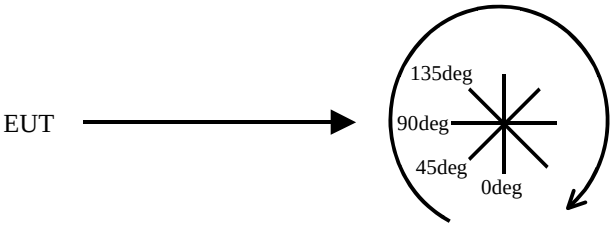


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise