RADIO TEST REPORT

Test Report No.: 30CE0005-SH-01-C-R2

Applicant	:	**RICOH COMPANY LTD.**
Type of Equipment	:	**Color Laser Printer**
Model No.	:	**Aficio SP C431DN**
FCC ID	:	**BBP-RFZEU01**
Test regulation	:	**FCC Part15 Subpart E: 2009**
Test result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This report is a revised version of 30CE0005-SH-01-C-R1. 30CE0005-SH-01-C-R1 is replaced with this report.

Date of test: January 13 to 18, 2010

Tested by: H. Shirasawa
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1 Applicant information

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

2.1 Identification of E.U.T.

Type of Equipment	:	Color Laser Printer
Model No.	:	Aficio SP C431DN
Serial No.	:	S9491117004
Rating	:	AC120 - 127V, 60Hz, 12A
Country of Mass-production	:	China
Receipt Date of Sample	:	January 8 2010
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

Model No: Aficio SP C431DN, referred to as the EUT in this report, is the Color Laser Printer.
Refer to the Appendix for the difference between the EUT and its similar models.

	RFID	**Wireless LAN**
Equipment type	Transceiver	Transceiver
Frequency of operation	13.56MHz	[11b/g] 2412-2462MHz *1) [11a] 5180-5320MHz
Clock frequency	13.56MHz	11MHz, 20MHz
Type of modulation	ASK 100%	IEEE802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE802.11b: DSSS (DBPSK, DQPSK, CCK) IEEE802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna type	Print pattern antenna	Chip antenna Antenna 1: Transmitting & Receiving Antenna 2: Receiving only
Antenna connector type	None	None
ITU code	A1D	D1D, G1D
Operation temperature range	+10 ~ +32 deg. C.	0 ~ +65 deg.C.

*1) Refer to 30CE0005-SH-01-B, FCC part 15C (FCC 15.247) report.

FCC Part15.31 (e)
Host device (Color Laser Printer) provides the Wireless LAN Module with stable power supply, and the power is not changed when voltage of the Color Laser Printer is varied. Therefore, the equipment complies power supply regulation.

FCC Part15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the transmitter. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3 Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part 15 Subpart E: 2009, final revised on December 2, 2009
Title : FCC 47CFR Part15 Radio Frequency Device
: Subpart E Unlicensed National Information Infrastructure Devices
: Section 15.407 General technical requirements

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted Emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	15.407 (b)(6) and 15.207	-	N/A	4.9dB (2.03543MHz, Tx 5260MHz, N, AV) (2.03528MHz, Tx 5260MHz, L1, AV)	Complied
26dB Emission Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407(a)(1)(2)	-	Excluded *1)	-	N/A
Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407 (a)(1)(2)	-	Excluded *1)		N/A
Peak Power Spectral Density	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407 (a)(1)(2)	-	Excluded *1)		N/A
Peak Excursion Ratio	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407 (a)(1)(2)(3)	-	Excluded *1)		N/A
Out of Band Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	15.407 (b)(1)(2)(4)(6) (7)	Conducted	Excluded *1)		N/A
Out of Band Emission & Restricted Band Edges	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.109, 15.407 (b)(1)(2)(5)(6) (7), 15.205 and 15.209	Radiated	N/A	4.4dB (92.149MHz, Vertical, Tx 5260MHz) (92.161MHz, Vertical, Tx 5280MHz) (92.157MHz, Vertical, Tx 5320MHz)	Complied
Dynamic Frequency Selection	FCC 06-96 APPENDIX	FCC 15.407 (h)(2)	-	Excluded *1)	N/A	N/A

Note: UL Japan's EMI Work Procedures No. QPM15.
These tests were also referred to FCC Public Notice DA02-2138 "Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands".

*1) These items were tested previously with Wireless LAN Module alone. The results were described in the test report 27IE0337-YK-F-R1 and 27KE0096-HO-A-R2 (FCC ID: BBP-WLRWL541), published by UL Japan, Inc. The Wireless LAN Module has been certificated on December 17, 2007.

Test results for RFID Module were described in the test report 30CE0005-SH-01-A.

The test has been performed for co-location operation.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	Complied

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

3.4 Uncertainty

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

Item	Frequency range	No.1 SAC*1/SR*2 (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) AMN/LISN	9kHz-150kHz	3.7 dB	3.1 dB	3.5 dB
	150kHz-30MHz	3.0 dB	2.6 dB	3.1 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.4 dB	2.7 dB	3.4 dB
	30MHz-300MHz	4.6 dB	4.5 dB	4.9 dB
	300MHz-1GHz	4.5 dB	4.6 dB	5.1 dB
	1GHz-18GHz	3.8 dB	3.9 dB	4.0 dB
Radiated emission (Measurement distance: 1m)	1GHz-18GHz	4.8 dB	4.8 dB	4.8 dB
	18GHz-40GHz	4.2 dB	4.2 dB	4.2 dB

*1: SAC=Semi-Anechoic Chamber
*2: SR= Shielded Room is applied besides radiated emission

Conducted Emission Test

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

Radiated Emission Test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test location

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No.1/ No.2/ No.3 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on April 17, 2009 (Registration No.: 697847).
IC Registration No. : 2973D-1 (No1 anechoic chamber)
2973D-2 (No2 anechoic chamber)
2973D-3 (No3 anechoic chamber)

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.1 Shielded room	6.8 x 4.1 x 2.7
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.2 Shielded room	6.8 x 4.1 x 2.7
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35 Maximum measurement distance: 5m	No.3 Shielded room	6.3 x 4.7 x 2.7
No.4 Full-anechoic chamber	8.1 x 5.1 x 3.55	No.4 Shielded room	4.4 x 4.7 x 2.7
		No.5 Shielded room	7.8 x 6.4 x 2.7
		No.6 Shielded room	7.8 x 6.4 x 2.7

3.6 Test setup, Data of EMI & Test instruments
Refer to Appendix 1 to 3.

4 System test configuration

4.1 Justification

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

Test item	Operating mode	Tested frequency
Conducted emission Spurious emission	Transmitting (IEEE802.11a), 54Mbps	Lower band (5150MHz-5250MHz) 5180MHz, 5200MHz, 5240MHz Upper band (5250MHz-5350MHz) 5260MHz, 5280MHz, 5320MHz
Restricted band edge	Transmitting (IEEE802.11a), 54Mbps	5180MHz, 5320MHz

The data setting for the test mode was set the burst rate as shown at page34.

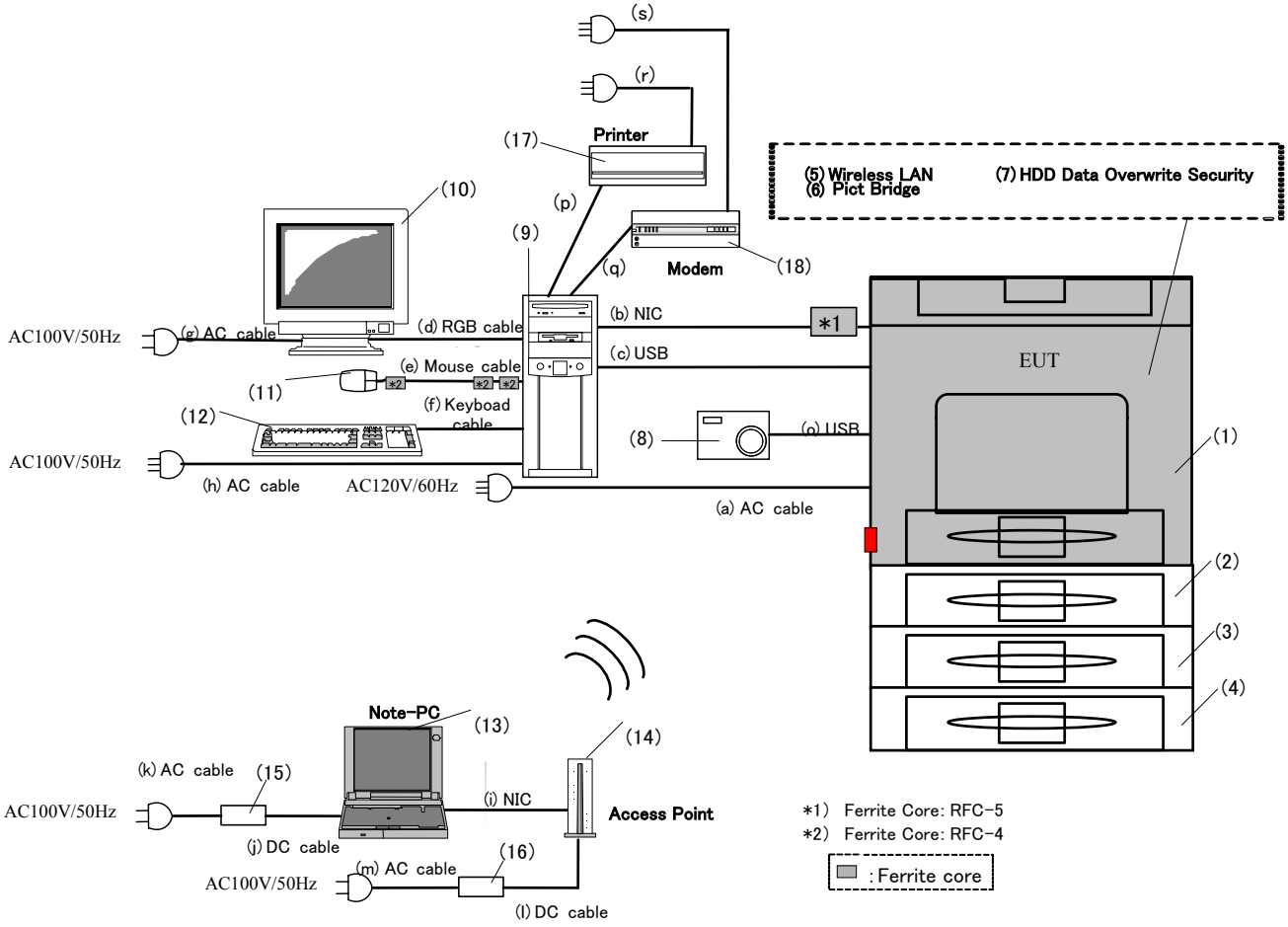
* RFID is also run into Transmitting mode.

Test item	Operating mode	Tested frequency
All items except for Transmitter carrier output levels	Transmitting (ASK), 26byte Mirror modulation from lower bit -> AM modulation 0x00, 0x00, 0xB3, 0x75, 0xB0, 0x00, 0x00, 0x80, 0x01, 0xff, 0xfe, 0x01, 0x23, 0x45, 0x67, 0x0B, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, CRC, CRC	13.56MHz

Four RFID modules which have the same specification are mounted in the equipment and they don't have simultaneous transmitting function. They were previously checked and the one in which the maximum emission occurred was chosen. ID tag was mounted in the Toner bottle inside of the EUT to communicate with each module.

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

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
1	Color Laser Printer	Aficio SP C431DN	S9491117004	RICOH	EUT *1)
2	Paper Bank 550	Paper Feed Unit PB1020	M384-170004	RICOH	Option
3	Paper Bank 550	Paper Feed Unit PB1020	M384-170036	RICOH	Option
4	Paper Bank 550	Paper Feed Unit PB1020	M384-170038	RICOH	Option
5	Wireless LAN	R-WL54CN （IEEE 802.11a/g Interface Unit Type L）	90500012	RICOH	Option FCC ID: BBP-WLRWL541
6	PictBridge	Camera Direct Print Card Type H	—	RICOH	Option
7	HDD Data Overwrite Security	Data Overwrite Security Unit Type K	_	RICOH	Option
8	Digital Camera	Caplio R1	20102981	RICOH	-
9	Personal Computer	DCCY	837K2BX	DELL	-
10	LCD Monitor	E153Fpb	CN-0C5378-46633-4BI255U	DELL	-
11	Mouse	SK-8115	CN-0J4637-71616-5CC-0MXO	DELL	-
12	Keyboard	MO56UC	E1E010TF	DELL	-
13	Note PC	ThinkPad X40	97-2132F	IBM	-
14	Access Point	AIR-AP1131AG-P-K9	FHK1102C01Z	CISCO SYSTEMS	-
15	AC Adapter	02K6808	11S02k680821Z3BG33YR25	IBM	-
16	AC Adapter	ADP-18PB	PZT0649766868	DELTA ELECTRONICS	-
17	Printer	BJ F600	ESF50801	Canon	-
18	Modem	ME3314B	6K07040	OMRON	-

*1) RFID modules are inside in the Color Laser Printer.

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
a	AC Cable	2.5	Unshielded	Unshielded	-
b	NIC Cable	3.0	Unshielded	Unshielded	Cross Cable
c	USB Cable	2.5	Shielded	Shielded	-
d	RGB cable	1.8	Shielded	Shielded	-
e	Mouse cable	1.85	Unshielded	Unshielded	-
f	Keyboard cable	1.85	Unshielded	Unshielded	-
g	AC Cable	1.8	Unshielded	Unshielded	-
h	AC Cable	1.8	Unshielded	Unshielded	-
i	NIC cable	1.8	Unshielded	Unshielded	Cross Cable
j	DC Cable	1.0	Unshielded	Unshielded	-
k	AC Cable	1.9	Unshielded	Unshielded	-
l	DC Cable	1.9	Unshielded	Unshielded	-
m	AC Cable	2.4	Unshielded	Unshielded	-
n	IEEE1284 Cable	1.2	Shielded	Shielded	-
o	USB(Pict) Cable	1.2	Shielded	Shielded	-
p	Parallel Cable	1.8	Shielded	Shielded	-
q	Parallel Cable	1.8	Shielded	Shielded	-
r	AC Cable	1.8	Unshielded	Unshielded	-
s	AC Cable	2.0	Unshielded	Unshielded	-

5 Conducted emission

5.1 Operating environment

The test was carried out in No.3 Shielded room.

Temperature : See test data
Humidity : See test data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 2.0m, raised 80cm above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was 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 LISN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the 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 50Ω connectors of the LISN were resistively terminated in 50Ω when not connected to the measuring equipment.
Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had 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 had been performed with a quasi-peak detector and if required, an average detector.
The conducted emission measurements were made with the following detector of the test receiver.

Detector Type : Quasi-Peak/ Average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass

6 Out of band emissions (Radiated)

6.1 Operating environment

The test was carried out in No.3 Semi-anechoic chamber.

6.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 2.0m, raised 80cm above the conducting ground plane to prevent the reflection influence. The configuration was set in accordance with ANSI C63.4: 2003. Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30MHz - 40GHz
Test distance : 3m (30MHz-10GHz), 1m (10-40GHz)

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m.
The measuring antenna height was varied between 1 and 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.
Measurements were performed with QP, PK, and AV detector.
The radiated emission measurements were made with the following detector function of the test receiver.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz, AV*1): RBW: 1MHz VBW: 100Hz (To see data at page 34)
Measuring antenna	Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

6.5 Band edge

Band edge level at 5150MHz and 5350MHz is below the limits of FCC 15.209. Refer to the data.

6.6 Results

Summary of the test results : Pass *No noise was detected above the 5th order harmonics.

APPENDIX 1: Photographs of test setup

APPENDIX 2: Test data

APPENDIX 3: Test instruments

APPENDIX 4: Similar model description