



RADIO TEST REPORT

Test Report No.: 31DE0105-SH

Applicant : RICOH COMPANY LTD.
Type of Equipment : Color Laser Printer
Model No. : Aficio SP C431DN
FCC ID : BBP-RFZEU01
Test regulation : FCC Part15 Subpart C: 2010
Test result : Complied

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Date of test: December 3, 4 and 6, 2010

**Representative
test engineer:**

Tatsuya Arai
Engineer of EMC Services

Approved by :

Go Ishiwata
Assistant Manager of EMC Service

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Contents

	<u>Page</u>
SECTION 1: Customer information	3
SECTION 2: Equipment under test (E.U.T.)	3
SECTION 3: Test specification, procedures & results	4
SECTION 4: Operation of E.U.T. during testing.....	7
SECTION 5: Conducted emission	9
SECTION 6: Radiated emission	10
Contents of appendixes	12
APPENDIX 1: Photographs of test setup.....	13
APPENDIX 2: Test data	15
APPENDIX 3: Test instruments	29

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SECTION 1: Customer information

Company Name : RICOH COMPANY LTD.
Address : 810 Shimoimaizumi, Ebina-shi, Kanagawaken 243-0460, Japan
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Facsimile Number : +81-46-292-9183
Contact Person : Akihiro Kurosaka

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

2.1 Identification of E.U.T.

Type of Equipment : Color Laser Printer
Model Number : Aficio SP C431DN
Serial Number : S9491117019
Rating : AC120 - 127V, 60Hz, 12A
Country of Mass-production : China
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : December 3, 2010
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: Aficio SP C431DN (referred to as the EUT in this report) is a Color Laser Printer.

Radio Specification

	RFID	Bluetooth
Equipment type	Transceiver	Transceiver
Frequency of operation	13.56MHz	2402-2480MHz
Clock frequency	13.56MHz	26MHz
Type of modulation	ASK 100%	FHSS
Antenna type	Print pattern	Monopole
Antenna connector type	None	U.FL
ITU code	A1D	F1D, G1D
Operation temperature range	+10 ~ +32 deg. C.	-40 ~ +85 deg.C.

FCC Part15.31 (e)

Host device (Color Copier) provides the Bluetooth dongle 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 Part 15.203

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

FCC Part15.247 (i)

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307 (b)(1) of this chapter. Please refer to the application documents of FCC ID: BBP-BT21A01.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2010, final revised on October 13, 2010
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,
and 5725-5850MHz

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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	FCC Section 15.207	-	N/A	5.5dB Freq.: 2.1590MHz Phase: L1 Detector: Average Mode: Tx 2441MHz (DH5)	Complied
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (a)(1)	Conducted	Excluded *1)	N/A	N/A
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (a)(1)	Conducted	Excluded *1)		N/A
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (a)(1)(iii)	Conducted	Excluded *1)		N/A
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (a)(1)(iii)	Conducted	Excluded *1)		N/A
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (b)(1)	Conducted	Excluded *1)		N/A
Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (d)	Conducted	Excluded *1)		N/A
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (d) Section 15.209	Radiated	N/A		8.3dB Freq.: 189.840MHz Detector: Quasi-Peak Polarization: Horizontal Mode: Tx 2441MHz (3DH5)

*1) These items were tested previously with Bluetooth dongle, R-BT21A alone (FCC ID: BBP-BT21A01). The results were described in the test report 31AE0037-HO-09-A.

Test results for RFID Module were described in the test report 30CE0005-SH-01-A-R1.

The test has been performed for co-location operation.

Note: UL Japan's EMI Work Procedures No. QPM05 and QPM15.

3.3 Addition to standard

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-13GHz	3.9 dB	3.9 dB	4.0 dB
Radiated emission (Measurement distance: 1m)	13GHz-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 test report has enough margin, more than site margin.

3.5 Test location

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JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 Full-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input checked="" type="checkbox"/> No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input type="checkbox"/> No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

3.6 Test setup, Data of test & Test instruments

Refer to Appendix 1 to 3.

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

4.1 Operating mode

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

Test item	Operating mode	Tested frequency
Conducted emission	Transmitting (DH5, 3DH5), Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Spurious emission (Radiated) & Band edge compliance	Transmitting (DH5, 3DH5), Payload: PRBS9 -Hopping ON/Inquiry -Hopping OFF	Spurious emission: 2402MHz, 2441MHz, 2480MHz Band edge compliance:
	Transmitting (DH5, 3DH5), Payload: PRBS9	2402MHz, 2480MHz

Software for testing: Bluetooth ver1.02 (custom)

Above setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting.

*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

* RFID is also run into Transmitting mode.

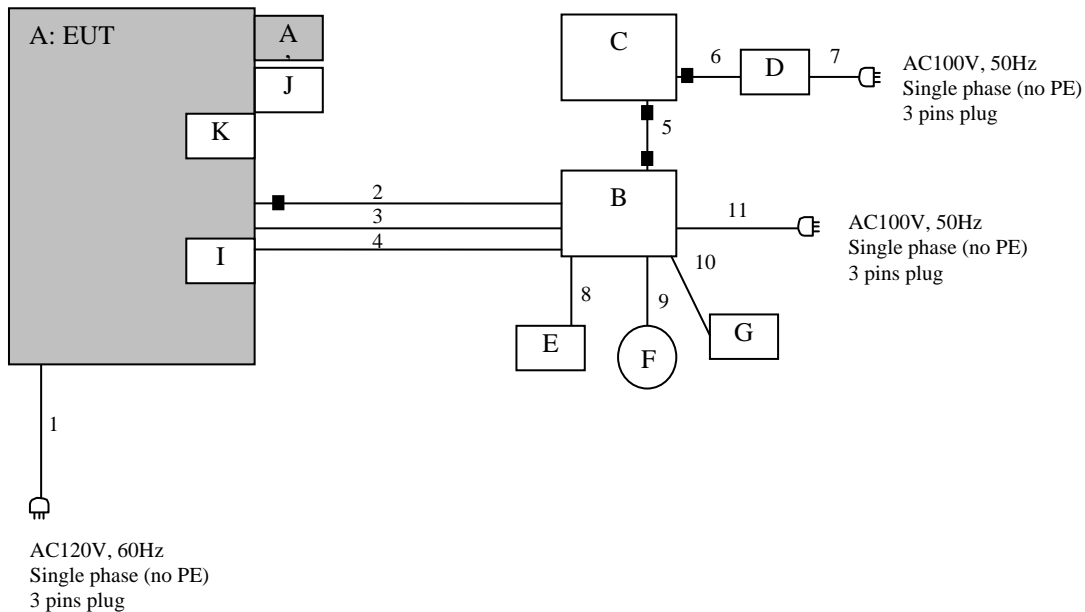
Test item	Operating mode	Tested frequency
All items	Transmitting (ASK), 26byte Mirror modulation from lower bit -> AM modulation 0x00, 0x00, 0xB3, 0x75, 0xB0, 0x00, 0x00, 0x80, 0x01, 0xff, 0xfe, 0x01, 0x23, 0x45, 0x67, 0x0B, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, CRC, CRC	13.56MHz

Software for testing: M0665500H (ver0.013)

Above setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting.

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.

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Color Laser Printer	Aficio SP C431DN	S9491117019	RICOH	EUT *1)
A`	Bluetooth Dongle	R-BT21A	No.1	RICOH	EUT
B	Personal Computer	HSTNC-014P-SP	431464-040 S135	hp	Support equipment.
C	LCD Monitor	AL-D40	JP74307151	hp	Support equipment.
D	AC Adaptor	CF-AA159	97101648B	hp	Support equipment.
E	Keyboard	KB-0316	435302-291	hp	Support equipment.
F	Mouse	M-SBJ96	390937-001	hp	Support equipment.
G	USB WriteScreen Tablet Pad	AHP5000	TD0004422	ICONTEC	Support equipment.
I	IEEE 1284 Board Type A	IEEE 1284	90700785	RICOH	Support equipment.
J	USB Memory	BSCRMSDCWH	-	Buffalo	Support equipment.
K	Media Link Board	File Format Converter Type E	91100022	RICOH	Support equipment.

*1) RFID modules are installed in the Color Copier.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	AC power	2.4	Unshielded	Unshielded	-
2	LAN	5.0	Unshielded	Unshielded	-
3	USB	5.0	Shielded	Shielded	-
4	Parallel	6.0	Shielded	Shielded	-
5	RGB	2.0	Shielded	Shielded	-
6	DC	1.5	Unshielded	Unshielded	-
7	AC	1.8	Unshielded	Unshielded	-
8	Keyboard	1.7	Shielded	Shielded	-
9	Mouse	1.7	Shielded	Shielded	-
10	RS 232C	1.8	Shielded	Shielded	-
11	AC power	1.8	Unshielded	Unshielded	-

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SECTION 5: Conducted emission

5.1 Operating environment

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

Temperature : See test data (APPENDIX 2)
Humidity : See test data (APPENDIX 2)

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The configuration was set in accordance with ANSI C63.4: 2003. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. 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. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Floor standing

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

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SECTION 6: Radiated emission

6.1 Operating environment

The test was carried out in No.3 Semi-Anechoic Chamber.

Temperature : See test data (APPENDIX 2)

Humidity : See test data (APPENDIX 2)

6.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The configuration was set in accordance with ANSI C63.4: 2003. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. 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. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30MHz to 26GHz

Test distance : 3m (below 13GHz) / 1m (above 13GHz)

EUT position : Floor standing

EUT operation mode : Refer to SECTION 4.1

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m or 1m. 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.

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

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz AV RBW : 1MHz/VBW: 300Hz (See the data) : 10Hz (No pulse emission)
Measuring antenna	Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)	Horn

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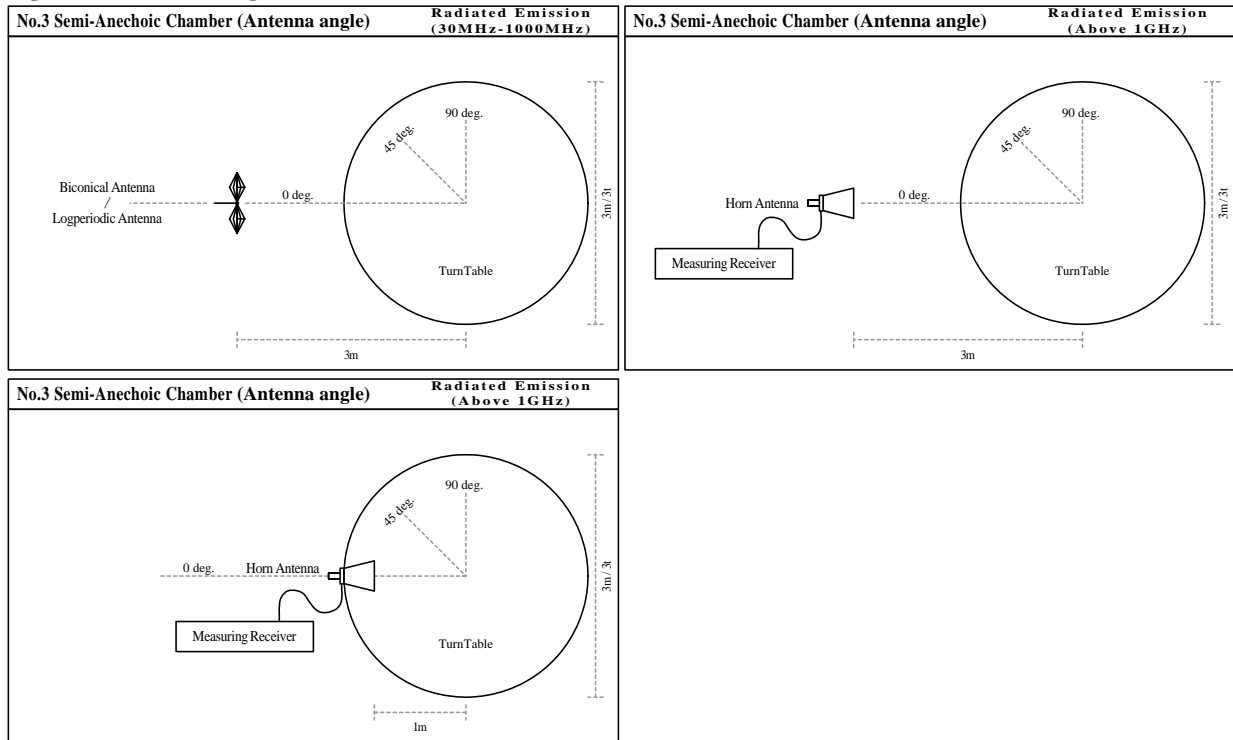
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Figure 1. Antenna angle



6.5 Band edge

Band edge level at 2400MHz is less than 20dB of peak point of the carrier. Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209. Refer to the data of Radiated emission.

6.6 Results

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

Contents of appendixes

APPENDIX 1: Photographs of test setup

Conducted emission Page 13
Radiated emission Page 14

APPENDIX 2: Data of test

Conducted emission Page 15 - 20
Radiated emission Page 21 - 28

APPENDIX 3: Test instruments

Test instruments Page 29