



RADIO TEST REPORT

Test Report No.: 28HE0080-YK-01-A

Applicant : Ricoh Company, Ltd.
Type of Equipment : Full-color MFP
Model No. : Aficio MP C2550
FCC ID : BBP-RFDIA01
Test regulation : FCC Part15 Subpart C: 2008
Test result : Complied

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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.

Date of test: June 26 and 27, 2008

Tested by: T. Arai
Tatsuya Arai

Approved by: T. Imamura
Toyokazu Imamura
Engineer of Yamakita EMC Lab.

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1 Applicant information

Company Name : Ricoh Company, Ltd.
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Contact Person : Akihiko Kurosaka

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

2.1 Identification of E.U.T.

Type of Equipment : Full-color MFP
Model No. : Aficio MP C2550
Serial No. : V2401000028
Rating : AC120V, 50/60Hz, 12A
Country of Mass-production : China
Receipt Date of Sample : June 26, 2008
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: Aficio MP C2550 (referred to as the EUT in this report) is a Full-color MFP.
Refer to the Appendix for the difference between the EUT and its similar models.

RFID specification

Equipment type : Transceiver
Frequency of operation : 13.56MHz
Clock frequency : 13.56MHz
Type of modulation : ASK 100%
Antenna type : Print pattern antenna
Antenna connector type : None
ITU code : A1D
Operation temperature range : +10 ~ +32 deg. C.

FCC Part15.31 (e)

Host device (Full-color MFP) provides the RFID module with stable power supply, and the power is not changed when voltage of the Full-color MFP is varied. Therefore, the equipment complies power supply regulation.

FCC Part15.203

It is impossible for end users to replace the antenna, because the antenna is mounted on the board integrally. 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 Part15 Subpart C: 2008, final revised on May 19, 2008
 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 15.215: Additional provisions to the general radiated emission limitations
 Section 15.225: Operation within the band 13.110-14.010MHz

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 15.207	-	N/A	1.9dB (27.1200MHz, N, L1, AV)	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.225 (a)	Radiated	N/A	81.4dB (Horizontal)	Complied
Electric Field Strength of Outside the Allocated bands	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.225 (b) (c)	Radiated	N/A	30.3dB (13.110MHz, Horizontal)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC15.209, FCC 15.225 (d)	Radiated	N/A	7.0dB (825.74MHz, Horizontal)	Complied
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC15.215(c)	Radiated	N/A	-	Complied
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC15.225 (e)	Radiated	N/A	-	Complied

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

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	Radiated	-	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.

	No.1 open site (±)	No.2 open site (±)	No.1 anechoic chamber (±)
Conducted emission			
150kHz-30MHz	2.8 dB	2.8 dB	2.8 dB
Radiated emission (3m)			
<30MHz	2.3 dB	2.3 dB	2.2 dB
30-300MHz	4.5 dB	4.4 dB	4.5 dB
300-1000MHz	4.3 dB	4.3 dB	4.3 dB

Frequency tolerance	(±)
	0.000014MHz

Conducted Emission Test

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

Radiated Emission Test

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

3.5 Test location

UL Japan, Inc. Yamakita EMC Lab.

907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN

Telephone number : +81 465 77 1011

Facsimile number : +81 465 77 2112

NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486).

IC Registration No. : 2973B-1

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on February 27, 2008 (Registration No.: 466226).

IC Registration No. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC Registration No. : 2973B-2

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 Semi-anechoic chamber	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5		
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

UL Japan, Inc.

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MF060b (09.01.08)

4 System test configuration

4.1 Operation mode

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.

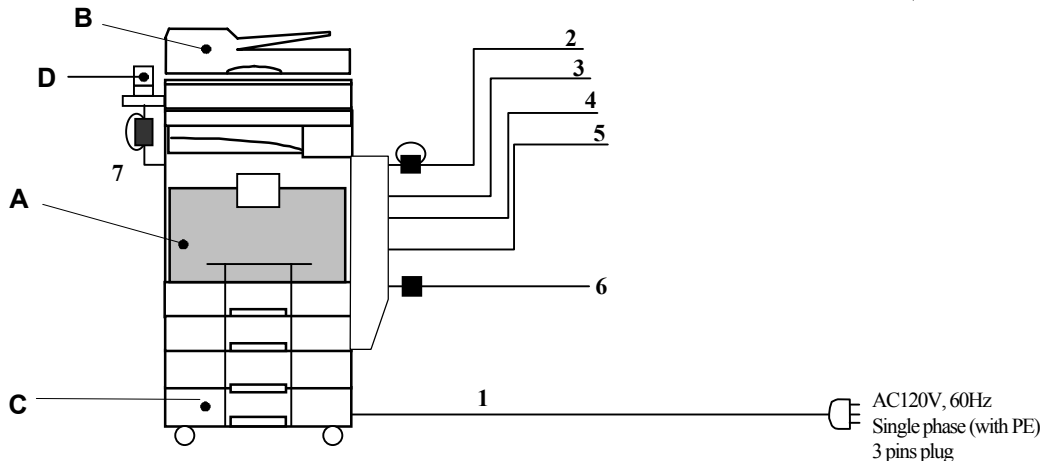
Test item	Operating mode	Tested frequency
All items except for Frequency tolerance	Transmitting (ASK), 26byte Mirror modulation from lower bit -> AM modulation 0x00, 0x00, 0xB3, 0x75, 0xB0, 0x00, 0x00, 0x80, 0x01, 0xff, 0xfe, 0x01, 0x23, 0x45, 0x67, 0x0B, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, CRC, CRC	13.56MHz
Frequency tolerance	Transmitting, Unmodulated	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 ribbon inside of the EUT to communicate with each module.

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

4.2 Configuration of tested system

■ : Ferrite core (Standard attachment)



* Test data was taken under worst case conditions.

Description of EUT and support equipments

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Full-color MFP	Aficio MP C2550	V2401000028	RICOH	EUT *1)
B	Document Feeder	DF3030(D366-7090)	00041	RICOH	-
C	Paper Bank	PB3030	M3980403988	RICOH	-
D	Telephone Handset	AF-33R	070	RICOH	-

*1) RFID modules are installed in the Full-color MFP.

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC power cable	2.0	Unshielded	Unshielded	-
2	Modular cable	2.0	Unshielded	Unshielded	With a ferrite core (2 turns, RFC-8, KG) at EUT side
3	USB cable (1)	3.0	Shielded	Shielded	-
4	USB cable (2)	3.0	Shielded	Shielded	-
5	USB cable (3)	3.0	Shielded	Shielded	-
6	LAN cable	3.0	Unshielded	Unshielded	With a ferrite core (1 turns, RFC-5, KG) at EUT side.
7	Hand Unit cable	0.5	Unshielded	Unshielded	With a ferrite core (2 turns, RFC-8, KG) at EUT side.

5 Conducted emissions

5.1 Operating environment

The test was carried out in No.1 anechoic chamber.

5.2 Test configuration

EUT was placed on a carpet for insulation above the ground plane. EUT was located 80cm from LISN and excess AC cable was bundled in center.

Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz

5.4 Test procedure

The EUT was connected to a LISN (AMN). An overview sweep with peak detection has been performed. The Conducted emission measurements were made with the following detector function of the test receiver.

Detector: QP/AV

IF Bandwidth: 9kHz

5.5 Results

Summary of the test results : Pass

Date : June 26, 2008 Test engineer : Tatsuya Arai

6 Radiated emissions (Fundamental, Spurious and Outside the Allocated bands)

6.1 Operating environment

The test was carried out in No.1 anechoic chamber.

6.2 Test configuration

EUT was placed on a wooden platform of nominal size, 1.0m by 1.0m, raised 10cm above the conducting ground plane to set the RFID module 80cm above the ground plane.
 Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 9kHz - 1GHz
 Test distance : 3m

6.4 Test procedure

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

Frequency: From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
 The measurements were performed for each antenna angle 0deg., 45deg. and 90deg.

Frequency: From 30MHz to 1GHz at distance 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.

	9kHz to 90kHz & 110kHz to 150kHz	90kHz to 110kHz	150kHz to 490kHz	490kHz to 30MHz	30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	10kHz	9kHz	120kHz
Measuring antenna	Loop antenna				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)

9kHz – 490kHz [Limit at 3m]= [Limit at 300m]-40log (3[m]/300[m])

490kHz – 30MHz [Limit at 3m]= [Limit at 30m]-40log (3[m]/30[m])

6.6 Results

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

Date : June 26, 2008 Test engineer : Tatsuya Arai

7 20dB bandwidth & Occupied bandwidth (99%)

Test procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Summary of the test results: Pass

Date : June 27, 2008 Test engineer : Tatsuya Arai

8 Frequency tolerance

Test procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.
The temperature test was started after the temperature stabilization time of 30 minutes.

Summary of the test results: Pass

Date : June 27, 2008 Test engineer : Tatsuya Arai

APPENDIX 1: Photographs of test setup

Page 11 : Conducted emission
Page 12 : Radiated emission

APPENDIX 2: Test data

Page 13 - 15 : Conducted emission
Page 16 - 18 : Radiated emission
16 : Fundamental and Outside the Allocated bands
17-18 : Spurious emission
Page 19 : Bandwidth
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APPENDIX 3: Test instruments

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APPENDIX 4: Similar model description

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