



# RADIO TEST REPORT

Test Report No.: 30IE0112-SH-01-D

Applicant : RICOH COMPANY LTD.  
Type of Equipment : Color Copier  
Model No. : Aficio MP C5501  
FCC ID : BBP-RFAPL03  
Test regulation : FCC Part15 Subpart E: 2010  
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.

Date of test: June 23, 25 and 29 2010

Tested by:

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MF060b (10.05.10)

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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 Copier  
 Model No. : Aficio MP C5501  
 Serial No. : V9610100004  
 Rating : AC120 - 127V, 12A  
 Country of Mass-production : China  
 Receipt Date of Sample : June 21 2010  
 Condition of EUT : Engineering 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 MP C5501, referred to as the EUT in this report, is the Color Copier.  
 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	Monopole 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 30IE0112-SH-01-C, FCC part 15C (FCC 15.247) report.

#### FCC Part15.31 (e)

Host device (Color Copier) provides the Wireless LAN Module with stable power supply, and the power is not changed when voltage of the Color Copier 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.

#### FCC Part15.407 (f) RF Exposure requirement

Please refer to the application documents of FCC ID: BBP-WLRWL541.

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### 3 Test specification, procedures and results

#### 3.1 Test specification

Test specification : FCC Part 15 Subpart E: 2010, final revised on January 22, 2010  
 And effective March 1, 2010  
 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	6.0dB (0.70331MHz, Tx 5200MHz, L1, QP) (0.70374MHz, Tx 5280MHz, L1, QP)	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	5.9dB (5350.000MHz, 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-B-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 30IE0112-SH-01-A.

The test has been performed for co-location operation.

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### 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 <sup>*1</sup> /SR <sup>*2</sup> (±)	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.

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### 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.

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## 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

Software for testing: D0895563 (Rev: 0.09)

Power setting value: 0x30

#### PC side

Software for testing: fping.exe (Rev: .2.4b2\_to-ipv6)

Transmitting period: 20msec

Data length: 3000bytes

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

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

Software for testing: D0895119 (Rev: 0.09:04)

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.

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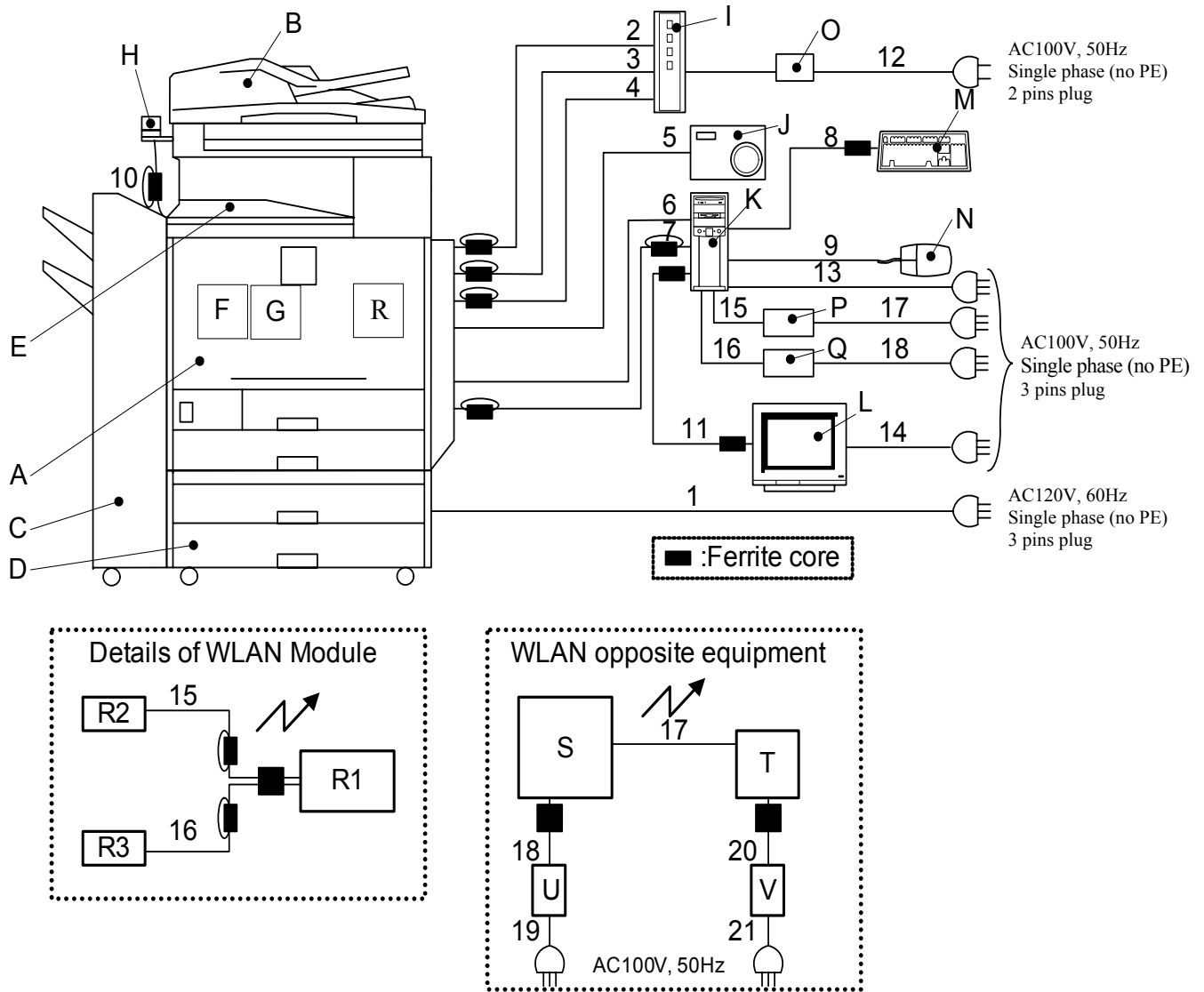
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4.2 Configuration and peripherals



\* Test data was taken under worse case conditions.



**Description of EUT and support equipment**

No.	Item	Model number	Serial number	Manufacturer	Remark
	<b>Color Copier</b>				EUT. This consists of A~H.
A	Color Copier	Aficio MP C5501	V9610100004	RICOH	
B	Document feeder	DF3010	3L39-208679	RICOH	
C	Booklet Finisher	Finisher SR3020	3L41-131436	RICOH	
D	Paper Bank	Paper Feed Unit PB3100	3M58-208447	RICOH	
E	Bridge Unit	Bridge Unit BU3030	3M36-132275	RICOH	
F	RF-ID part	RFID:RW D0895177	9C9065	RICOH	
G	Media Slot	Type 12	3M95-110849	RICOH	
H	Telephone Handset	Hand Set Type 1018	C036/1184 6443A	RICOH	
I	Telephone Exchanger	HP-208	8400066d	TAKACOM	Support equipment.
J	Digital Camera	Caplio R1	00117102	RICOH	Support equipment.
K	Personal Computer	OPTIPLEX 755	CGWWDBX	DELL	Support equipment.
L	LCD Monitor	E153FPb	CN-0C5378-46 633-589-44GU	DELL	Support equipment.
M	Keyboard	L100	CN0RH657658 9082Q01LV	DELL	Support equipment.
N	Mouse	MOC5U0	G1E025EP	DELL	Support equipment.
O	AC Adaptor	AC-HP2800	P1TT00000560	Nishinohon Denshi	Support equipment.
P	Modem	ME3314B	6K07040	OMRON	Support equipment.
Q	Printer	BJ F600	-	Canon	Support equipment.
R1	WLAN Module	R-WL54MN	00100003	RICOH	FCC ID: BBP-WLRWL541
R2	Antenna 1	ANT0602-WMFW/N-AB	-	NISSEI ELECTRIC	
R3	Antenna 2	ANT0602-WMFW/N-AB	-	NISSEI ELECTRIC	
S	Note PC	ThinkPad X40	97-2131K	IBM	
T	Access Point	AIR-API1131AG-P-K9	FHK1102C01Y	CISCO SYSTEMS	
U	AC Adaptor	02K6808	11S02K6808Z1 89H446VZV	IBM	
V	AC Adaptor	ADP-18PB	PZT064976687 9	DELTA ELECTRONICS	

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

**List of cables used**

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	AC power cable	2.5	Unshielded	Unshielded	-
2	Modular cable (1)	2	Unshielded	Unshielded	With a ferrite core (2 turns, K3 NF-75(N)BK0, FERRICO) at facsimile side.
3	Modular cable (2)	2	Unshielded	Unshielded	With a ferrite core (2 turns, K3 NF-75(N)BK0, FERRICO) at facsimile side.
4	Modular cable (2)	2	Unshielded	Unshielded	With a ferrite core (2 turns, K3 NF-75(N)BK0, FERRICO) at facsimile side.
5	USB cable (1)	3	Shield	Shield	
6	USB cable (2)	3	Shield	Shield	
7	LAN cable	3	Unshielded	Unshielded	With a ferrite core (2 turns, RFC-13, KG) at EUT side.
8	Keyboard cable	2	Unshielded	Unshielded	
9	Mouse cable	1.8	Unshielded	Unshielded	
10	Modular cable (3)	0.5	Unshielded	Unshielded	With a ferrite core (2 turns, RFC-8, KG) at EUT side.
11	RGB cable	1.5	Shielded	Shielded	
12	AC power cable	1.5	Unshielded	Unshielded	
13	AC power cable	1.5	Unshielded	Unshielded	
14	AC power cable	1.5	Unshielded	Unshielded	
15	Antenna Cable	0.9	Shielded	Shielded	
16	Antenna Cable	0.9	Shielded	Shielded	
17	LAN Cable	0.4	Unshielded	Unshielded	
18	DC Cable	1.8	Unshielded	Unshielded	
19	AC Cable	1.0	Unshielded	Unshielded	
20	DC Cable	1.8	Unshielded	Unshielded	
21	AC Cable	2.4	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 carpet for insulation above the ground plane. EUT was set up typical spacing for the other equipment. 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. 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 : 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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## 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 carpet for insulation 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: 43Hz (To see data at page 34) VBW: 10Hz (No pulse emission)
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 5<sup>th</sup> order harmonics.

### **APPENDIX 1: Photographs of test setup**

Page 14 : Conducted emission

Page 15 : Radiated emission

### **APPENDIX 2: Test data**

Page 16 - 21 : Conducted Emission

Page 22 - 34 : Out of band emissions (Radiated)

### **APPENDIX 3: Test instruments**

Page 35 : Test instruments

### **APPENDIX 4: Similar model description**

Page 36 : Similar model description

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