

RADIO TEST REPORT

Test Report No.: 31BE0047-SH-E

Applicant : RICOH COMPANY LTD.
Type of Equipment : Color Copier
Model No. : Pro C751EX
FCC ID : BBP-RFTAU01
Test regulation : FCC Part15 Subpart C: 2010
Test result : Complied

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Date of test: November 11 and 12, 2010

**Representative
test engineer:**



Tatsuya Arai
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Approved by :



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SECTION 1: Customer information

Company Name : RICOH COMPANY LTD.
Address : 810, Shimo-imaizumi, Ebina-shi, Kanagawa, 243-0460 JAPAN
Telephone Number : +81 46 292 3468
Facsimile Number : +81 3 6893 1409
Contact Person : Hiroyuki Kuroda

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

2.1 Identification of E.U.T.

Type of Equipment : Color Copier
Model Number : Pro C751EX
Serial Number : G000000020
Rating : AC208 - 240V~ 50/60Hz, 16A, 4kW
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : November 4, 2010
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: Pro C751EX (referred to as the EUT in this report) is a Color Copier.

Description of The EUT

The EUT is the color digital copier machine with high speed and high endurance, which is available also for a printer and a scanner.

General Features

1. The machine fits seemliness into high volume production environments with its optimum reliability, sophisticated finishing and professional software solutions.
2. The machine employs advanced 4-tandem drum system and image transfer belt technology to ensure dependability in even the most demanding environments.
3. The machine offers the choice of a number of finishing options including stapling, booklet making and online punching.
4. Scan-to-email and Scan-to-folder allow efficient distribution of scanned files and documents.

<Radio part>

Radio Type : Transceiver
Frequency of Operation : 13.56MHz
Clock frequency : 13.56MHz
Modulation : ASK 100%
Power Supply (inner) : DC 5.0V
Antenna type : Print pattern antenna
ITU code : A1D
Operating Temperature : +5 deg C - +45 deg C

FCC 15.31 (e)

Host device (Color Copier) provides the radio block 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.

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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 December 6, 2010
 and effective January 5, 2011
 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 bands 13.110-14.010MHz.

* The revision on December 6, 2010 does not affect the test specification applied to the EUT.

The EUT complies with FCC Part 15 Subpart B: 2010. Refer to the test report: 31BE0047-SH-B.

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 Section15.207	-	N/A	7.4 dB Freq: 0.17502 MHz Detector: Quasi-Peak Phase: L1	Complied
Electric field strength of Fundamental emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.225 (a)	Radiated	N/A	73.4dB Polarization: Vertical	Complied
Electric field strength of Outside the allocated bands	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.225 (b)(c)	Radiated	N/A	45.7dB Freq: 14.010MHz Polarization: Vertical	Complied
Electric field strength of Spurious emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.209 FCC Section15.225 (d)	Radiated	N/A	6.1dB Freq: 624.997MHz Polarization: Vertical	Complied
20dB bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.215 (c)	Radiated	N/A	-	Complied
Frequency tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.225 (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

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

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

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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	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

*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.

Frequency tolerance

Frequency Measurement uncertainty (with a 95% confidence level) for this test was: (±) 1.3×10^{-6} .

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 checked="" 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 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 checked="" 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 checked="" 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, Test data & 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
All items except for Frequency tolerances	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, CRC, CRC	13.56MHz
Frequency tolerances	Transmitting Unmodulated	13.56MHz

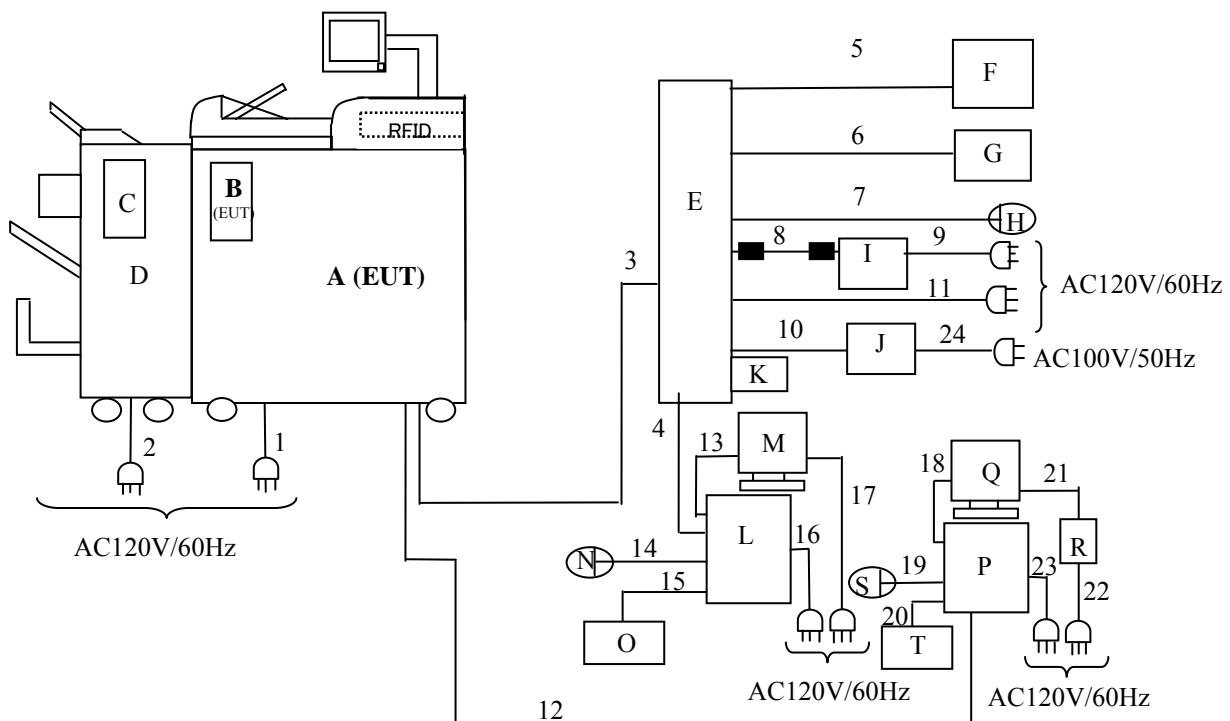
Software for testing: D0745404 Ver. 0.32:02

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

■ : Ferrite core



* 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	FCC ID	Remark
A	Color Copier	Pro C751EX	G000000020	RICOH	BBT-RFTA U01	EUT*1)
B	Decurler Unit DU5010		K20SJ0080011	RICOH	-	-
C	Punch Unit	Punch Unit PU5020 NA	DM00-000177	RICOH	-	-
D	Finisher	Booklet Finisher SR5040	10050	RICOH	-	-
E	EFI fiery Server Controller	Color Controller E-41A (PR080-16)	P00001143	RICOH	-	-
F	Spectrometer	ES-1000	3.278-872141-7	EFI	-	-
G	KeyBoard	G-224	G0008101	CHERRY	-	-
H	Mouse	M-5400	00003439V24	CHERRY	-	-
I	LCD Monitor	943BWT	MY19H9LS91630F	SAMSUNG	-	-
J	Modem	ME5614E2	7GT00821G	Omron	-	-
K	USB memory	RUF2-K8GE-WH	H0851	BUFFALO	-	-
L	HOST PC	OptiPlex GX520	8J7K2BX	DELL	-	-
M	LCD Display	E153Fpb	CN-0C5378-46633-4B I-256U	DELL	-	-
N	Mouse	MO56UC	F0C003DD	DELL	-	-
O	KeyBoard	SK-8125	CN-0RH657-65890-7 AN-01HB	DELL	-	-
P	HOST PC	Dc5700SF/512M	JPA8080BGN	HP	-	-
Q	LCD Display	D5060A	JP74307384	HP	-	-
R	AC Adapter	CF-AA159	H2 0950-320997101361B	HP	-	-
S	Mouse	M-SBJ96	F93AA0AN3V60091	HP	-	-
T	KeyBoard	KB-0316	BC3480DGAVJ69Q	HP	-	-

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

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List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC	4.0	Unshielded	Unshielded	-
2	AC	1.9	Unshielded	Unshielded	-
3	LAN (Cat.5e)	12.0	Unshielded	Unshielded	-
4	LAN (Cat 5e)	3.0	Unshielded	Unshielded	-
5	USB	2.0	Shielded	Shielded	-
6	USB (KeyBoard)	1.7	Shielded	Shielded	-
7	USB (Mouse)	1.7	Shielded	Shielded	-
8	RGB	1.4	Shielded	Shielded	-
9	AC	1.9	Unshielded	Unshielded	-
10	RS232C	1.2	Shielded	Shielded	-
11	AC	2.0	Unshielded	Unshielded	-
12	LAN (Cat 5e)	3.0	Unshielded	Unshielded	-
13	RGB	1.8	Shielded	Shielded	-
14	USB (Mouse)	1.8	Shielded	Shielded	-
15	USB (KeyBoard)	2.0	Shielded	Shielded	-
16	AC	2.0	Unshielded	Unshielded	-
17	AC	2.0	Unshielded	Unshielded	-
18	RGB	1.8	Shielded	Shielded	-
19	USB (Mouse)	1.8	Shielded	Shielded	-
20	USB (KeyBoard)	1.3	Shielded	Shielded	-
21	DC	1.8	Unshielded	Unshielded	-
22	AC	1.8	Unshielded	Unshielded	-
23	AC	2.0	Unshielded	Unshielded	-
24	AC	1.8	Unshielded	Unshielded	-

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SECTION 5: Conducted emission

5.1 Operating environment

The test was carried out in No.2 semi-anechoic chamber.

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 : 0.15MHz - 30MHz
EUT position : Table top
EUT operation mode : Refer to SECTION 4.1

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a Shielded 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 detection of the test receiver.

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

5.5 Results

Summary of the test results : Pass

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SECTION 6: Radiated emission (Fundamental, spurious and outside the allocated bands)

6.1 Operating environment

The test was carried out in No.2 semi-anechoic chamber.

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

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 : 9kHz - 1GHz
Test distance : 3m
EUT position : Table top
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 (Refer to Figure 1).

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 vertical polarization (antenna angle: 0deg.to 360deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 2.

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	9kHz	9kHz	120kHz
Measuring antenna	Loop antenna				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

* FCC 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])

The carrier level and noise levels were confirmed at each case of module Ch0: Black, module Ch1: Magenta, module Ch2: Cyan and module Ch3: Yellow of EUT to see the module of maximum noise, and the test was made at the module that has the maximum noise.

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Combinations of the worst case

Model	Worst case	
	Below 30MHz	Above 30MHz
Module	Module Ch0: Black	Module Ch0: Black

6.5 Results

Summary of the test results : Pass

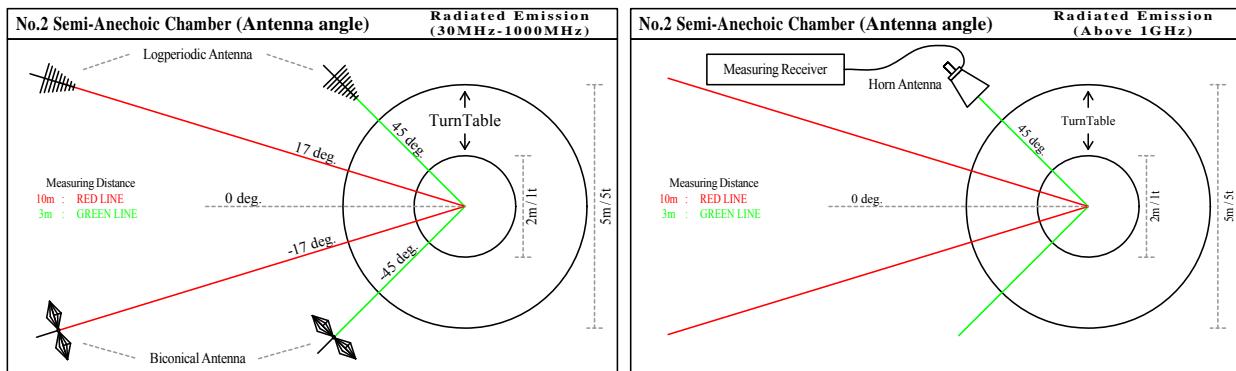
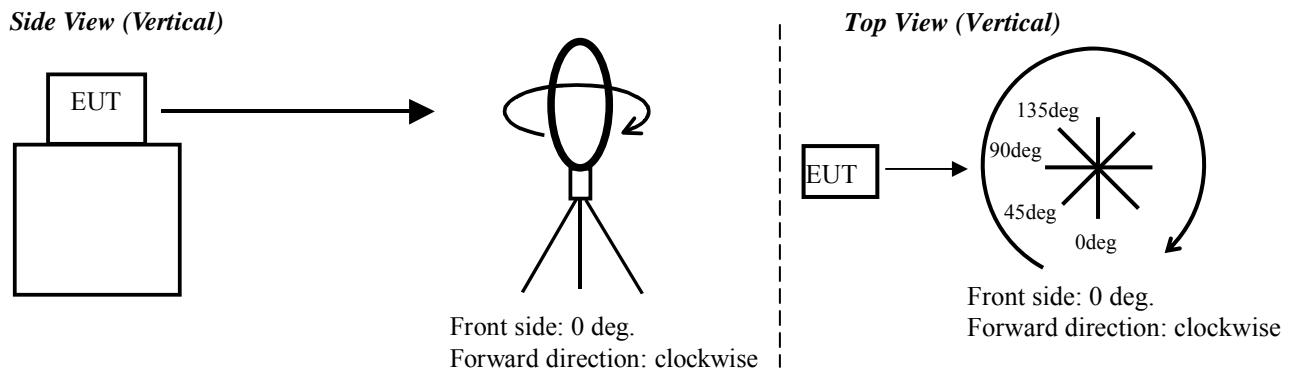
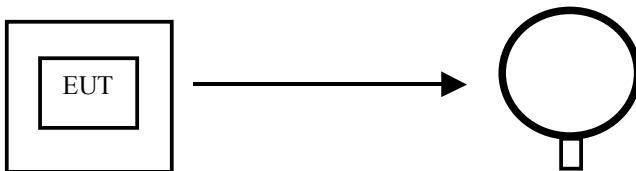


Figure 1. Antenna angle



Top View (Horizontal)



Antenna was not rotated.

Figure 2. Direction of the Loop Antenna

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SECTION 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

SECTION 8: Frequency tolerances

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

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