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# TEST REPORT

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REPORT NUMBER : AKL-200027  
APPLICANT : RICOH COMPANY, LTD.  
MODEL NUMBER : MP7120A  
FCC ID : BBP7120A  
REGULATION : FCC Part15B Class B  
Canada ICES- 003 Class B

Conducted Emission Test  
Radiated Emission Test



NVLAP accreditation is valid only  
FCC Part15(Digital Devices),  
CISPR22, and AS/NZS 3548  
test reports.

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Kakegawa Site

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## ABBREVIATIONS

LISN = Line Impedance Stabilization Network

AMN = Artificial Mains Network

ANT = Antenna

BBA = Broad-band Antenna

DIP = Dipole Antenna

AMP = Amplifier

ATT = Attenuator

EUT = Equipment Under Test

Q-P = Quasi-peak

AVG = Average

CD-R/RW Drive = Compact Disk Recordable / Rewritable Drive

ATAPI = AT Attachment Packet Interface

PSU = Power Supply Unit

## SECTION 1. TEST CERTIFICATION

## APPLICANT INFORMATION

Company : RICOH COMPANY, LTD.  
Address : 3-2-3, Shin-yokohama, Kohoku-ku, Yokohama-shi, Kanagawa-ken,  
222-8530 Japan  
Telephone number : +81 45 477 1663  
Fax number : +81 45 477 1649

## DESCRIPTION OF TEST ITEM

Kind of equipment : CD-R/RW Drive  
Condition of equipment : Pre-Production  
Type : Table-Top (Built-in type)  
Trademark : RICOH  
FCC ID : BBP7120A  
Model number : MP7120A  
Serial number : DVT-216

## TEST PERFORMED

Location : Kakegawa No. 2 Test Site (FCC File No. : 31040/SIT)  
EUT received : April 27, 2000  
Test started : April 27, 2000  
Test completed : April 28, 2000  
Purpose of test : FCC Docket 87-389  
and Canadian Interference-Causing Equipment Regulations  
Regulation : FCC Part15B Class B and Canada ICES-003 Class B  
Unintentional Radiators  
Test setup : ANSI C63.4-1992

Report file number : AKL-200027  
Report issue date : May 2, 2000  
Test engineer : Hiromi Muramatsu  
Report approved by : Seiji Matsuda  
[Site Manager]

This equipment complies with above standard or regulation under the test condition or test configuration shown on this test report.

Responsible Party of Test Item (Product)

## SECTION 2. CONCLUSION

This test report clearly shows that the EUT is in compliance with the FCC Part 15B Class B specification and the Canada ICES-003 Class B specification.

Traceability to national standards of test result is achieved by means of calibration traceability to national standards.

The minimum margins to the limits are as follows:

Conduction measurement			
Read mode	6.0 dB	at	24.2941 MHz
Write mode	7.1 dB	at	24.2811 MHz
Radiation measurement			
Read mode	5.9 dB	at	56.76 MHz
Write mode	6.5 dB	at	56.76 MHz
		at	72.89 MHz

Note : See Section 9 for details.

## SECTION 3. EQUIPMENT UNDER TEST

The equipment under test (EUT) consisted of the following equipment.  
Indication in the following left side column corresponds to Section 6.

Symbol	Item	Model No.	Serial No.	FCC ID / DoC	Manufacturer	Remark
A)	CD-R/RW Drive	MP7120A	DVT-216	BBP7120A	RICOH COMPANY,LTD	EUT

Power ratings of EUT : DC 5V, 2A  
DC 12V, 1A

DoC : Device for Declaration of Conformity

## 3.1 Port(s)/Connector(s) :

Port name	Connector type	Connector pin	Remarks
Headphone	Mini-Jack	1 pin	
ATAPI	Pin Header	40 pin	
Audio Out (Analog)	Pin Header	4 pin	
Audio Out (Digital)	Pin Header	2 pin	

## 3.2 Oscillator(s)/Crystal(s) :

Oscillator	Operating frequency	Board name	Remarks
24.00 MHz	24.00 MHz	Main PCB	
33.86 MHz	33.86 MHz	Main PCB	
340.00 MHz	340.00 MHz	Pickup Module	Highest frequency

## SECTION 4. SUPPORT EQUIPMENT USED

The EUT was supported by the following equipment during the test. Indication in the following left side column corresponds to Section 6.

Symbol	Item	Model No.	Serial No.	FCC ID / DoC	Manufacturer	Remarks
B)	Computer	D6612A	SG85301261	DoC	Hewlett Packard	
C)	CRT Display	444	544BA11AA395	BR8SM-1557	Compaq	
D)	Printer	2225C+	2950S64811	DSI6XU2225	Hewlett Packard	
E)	Modem	OPTIMA288	AO125240K346	BFJ5201AM	Hayes	
F)	Keyboard	SK-2502	M981236181	GYUR41SK	Hewlett Packard	
G)	Mouse	M-S34	LZC84606329	DZL211029	Hewlett Packard	
H)	Headphone	MDR-CD1700	None	N.A.	SONY	
I)	AC Adapter	82241AJ	None	N.A.	Hewlett Packard	
J)	AC Adapter	TRAC288	None	N.A.	RICOH COMPANY, LTD.	
K)	Sound Card	A471-N60	01000019887100 03	LWHA471N6	LABWAY	

DoC : Device was tested and authorized under a Declaration of Conformity to the applicable FCC rules.

## SECTION 5. CABLE (S) USED

The following cable(s) was used for the test.

Indication number in the following left side column corresponds to Section 6.

Number	Name	Length	Shield	Connector
1)	Audio cable	0.37 m	None	Plastic
2)	ATAPI cable	0.30 m	None	Plastic
3)	Headphone cable	2.80 m	None	Metal
4)	RS-232C cable	1.50 m	Yes	Metal
5)	Printer cable	1.50 m	Yes	Metal
6)	Keyboard cable	1.70 m	Yes	Metal
7)	Mouse cable	1.80 m	Yes	Metal
8)	CRT Video cable	1.40 m	Yes	Metal
9)	Power cord for Computer Internal PSU DC	0.45 m	None	
10)	Power cord for Computer	2.20 m	None	
11)	Power cord for CRT Display	1.90 m	None	
12)	Power cord for Printer	2.00 m	None	
13)	Power cord for Modem (E)	0.85 m	None	
14)	Power cord for AC Adapter (J)	1.75 m	None	

Note :

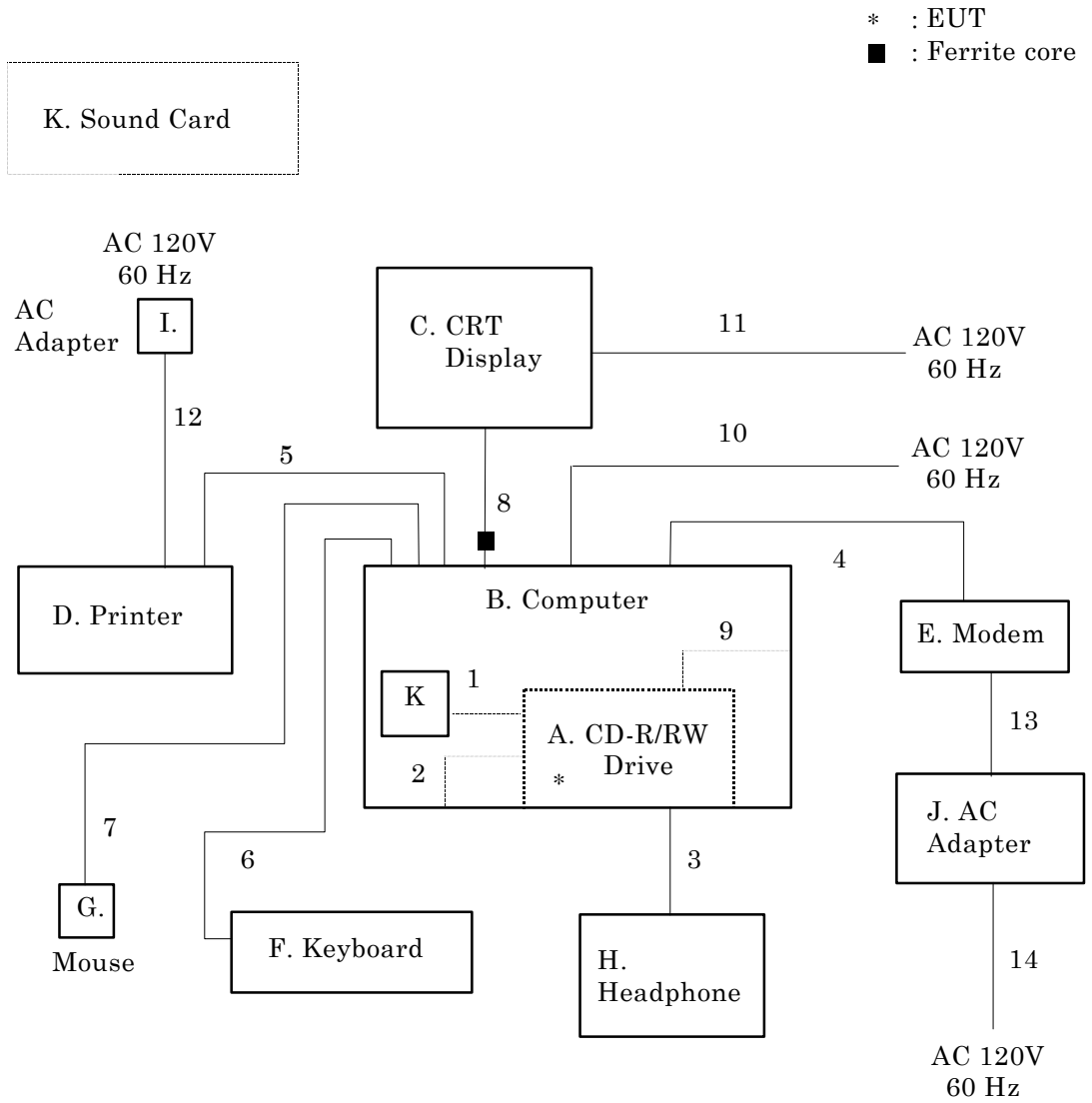
- a. One ferrite core is permanently attached to CRT Video cable.



SECTION 6. CONSTRUCTION OF EQUIPMENT

The construction of EUT during the test was as follows.

System configuration



Symbols or numbers assigned to equipment or cables on this diagram are corresponded to the symbols or numbers assigned to equipment or cables on tables in Sections 3 to 5.

## SECTION 7. OPERATING CONDITIONS

The EUT was operated under the following conditions during the test.

### 7.1 Operating condition

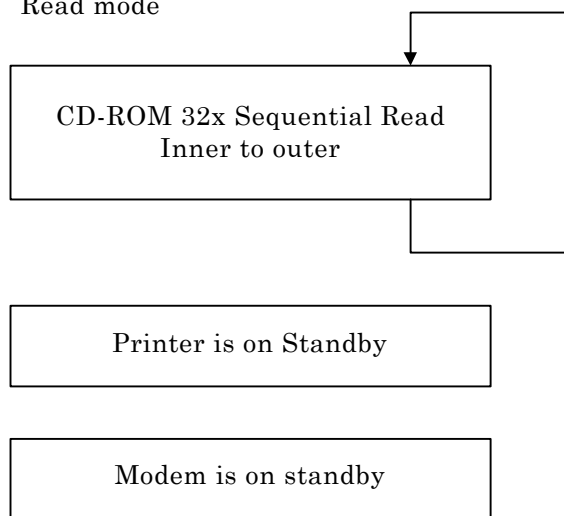
The test was carried out under Read mode and Write mode.

EUT was examined in the operating conditions that had maximum emissions.

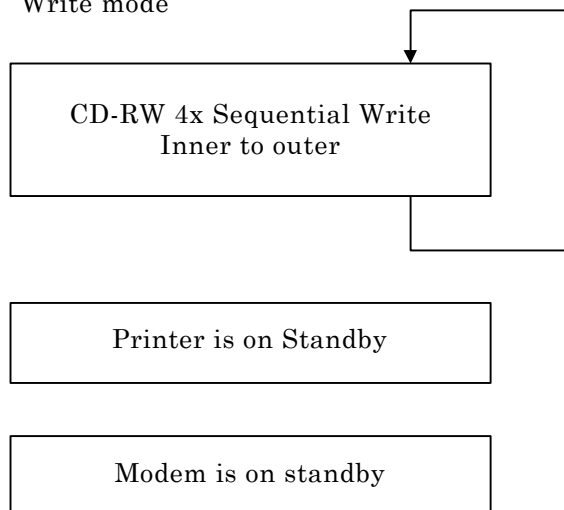
### 7.2 Operating flow

Following operations were performed continuously.

#### 7.2.1 Read mode



#### 7.2.2 Write mode



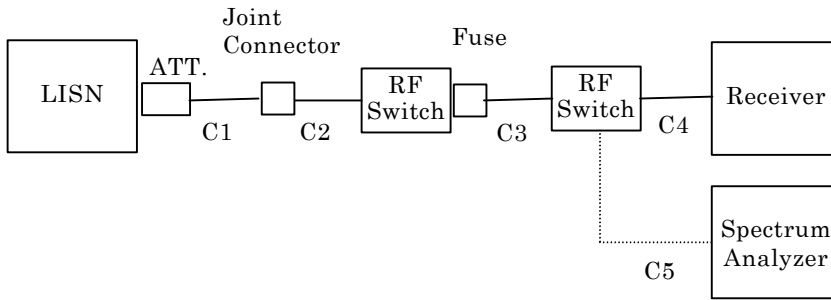
SECTION 8. TEST PROCEDURE(S)

Test was carried out under the following conditions.

Test was carried out with no deviations from standards and test methods.

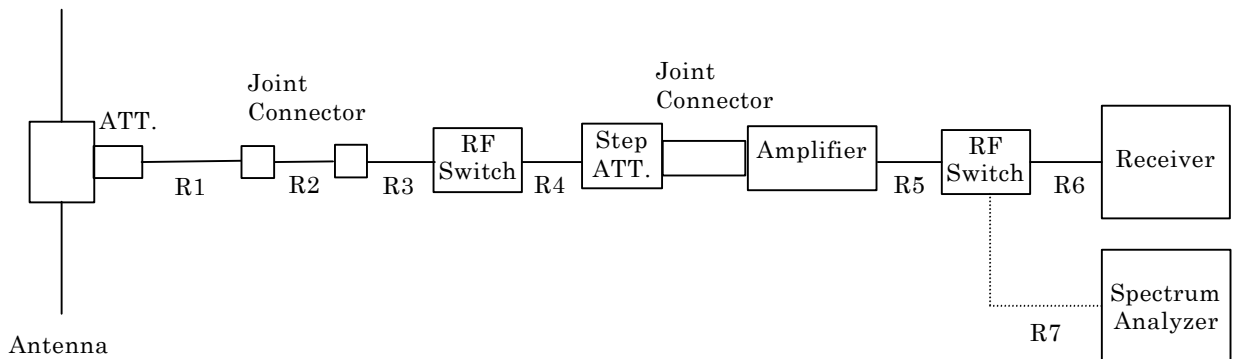
Subject	Test procedure	Scan frequency
Conducted Emission	Akzo Kashima Document number : 03-10-004	0.45 - 30 MHz
Radiated Emission	Akzo Kashima Document number : 03-10-003	30 - 2000 MHz

Schema for the conducted measurement



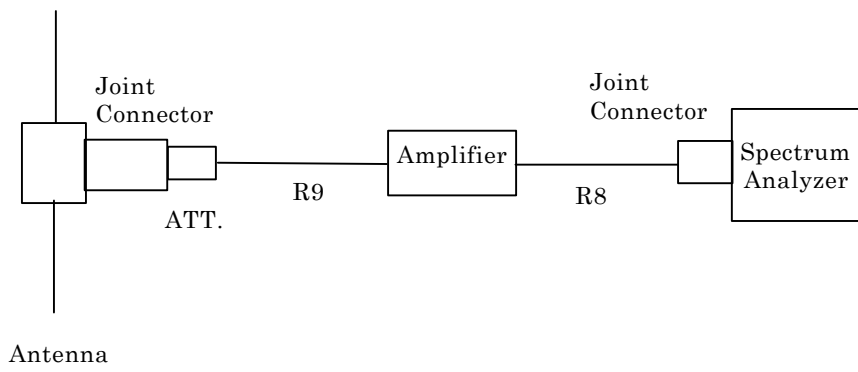
Abbreviations : LISN = Line Impedance Stabilization Network  
Line Impedance Stabilization Network(LISN) = Artificial Mains Network(A.M.N.)

Schema for the radiated measurement(30M-1000MHz)



Abbreviations : ATT. = Attenuator

Schema for the radiated measurement(1000M-2000MHz)



Abbreviations : ATT. = Attenuator

## Summary ;

### 8.1 Conducted Emission Test

#### 8.1.1 Equipment Setup

System configuration and Equipment setup are shown on Section 6 and Section 10.

##### 8.1.1.1 Table-Top Equipment

EUT is placed on the wooden table raised 0.8meter above the metal ground plane.

##### 8.1.1.2 Interconnecting Cables

Excess part of the interconnecting cables longer than 1 meter are bundled in the center. Cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long, hanging approx, in the middle between ground plane and table.

##### 8.1.1.3 AC Power Cord

AC power cord for EUT is connected to one LISN which is placed on top of ground plane. The LISN is placed in 80 cm from the nearest part of EUT chassis.  
The excess power cable is bundled in the center, or shortened to appropriate length.  
AC cables except from the EUT are connected second LISN.

#### 8.1.2 Measuring Instruments

Measuring instruments list and calibration schedule are shown on Section 11, and brief description are as follows;

##### 8.1.2.1 Spectrum Analyzer

The Spectrum analyzer is used for preliminary measurement.

##### 8.1.2.2 EMI Test Receiver

The Quasi-peak detector(Resolution bandwidth : 10 kHz) and average detector (Resolution bandwidth : 10 kHz) built in test receiver is used for final measurement.  
The test receiver is complied with the specification of the CISPR publication 16.

##### 8.1.2.3 LISN

The 50 $\mu$ H/50 $\Omega$  LISN is used. The chassis of the LISN is bonded to the ground plane by the copper blade.  
The lead to be tested is selectable by switch, and the terminals which are not connected to the EUT are terminated in 50 $\Omega$  resistor termination.

### 8.1.3 Test Procedure

#### 8.1.3.1 Preliminary Measurement

EUT is tested on all operating conditions.

The spectrum analyzer is controlled by the computer program to sweep regulation frequency, then spectrum chart are plotted out to detect the worst conditions in operating mode and/or configuration for the final test.

All leads other than safety ground are tested.

#### 8.1.3.2 Final Measurement

The EUT is operated in the worst condition where maximum emission is detected by the preliminary test. The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.

The each spectrum to be tested are measured in quasi-peak using the test receiver. When the value in the quasi-peak mode is higher than the limit in the standard, the measurement in the average mode is done to compare to the value in the quasi-peak mode. If the value in the quasi-peak mode exceeds the value in the average mode by more than 6 dB, the value reducing 13 dB from the value in the quasi mode is used to compare to the limit.

## 8.2 Radiated Emission Test

### 8.2.1 Equipment Setup

System configuration and Equipment setup are shown on Section 6 and Section 10.

#### 8.2.1.1 Table-Top Equipment

EUT is placed on the wooden table raised 0.8meter above the metal ground plane(turntable).

#### 8.2.1.2 Interconnecting Cables

Excess part of the interconnecting cables longer than 1 meter are bundled in the center. Cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long, hanging approx, in the middle between ground plane and table.

## 8.2.2 Measuring Instruments

Measuring instruments list and calibration schedule are shown on Section 11, and brief description are as follows;

### 8.2.2.1 Antennas

The broadband Bi-cog antenna is used for measurement on the frequency range 30 – 1000 MHz.

The Double ridged guide antenna is used for frequency higher than 1000 MHz. If uncertain result was obtained, the broadband antenna is replaced by the half wave length dipole, then measurement is carried out over again.

### 8.2.2.2 Pre-amplifier

The broadband pre-amplifier is used for radiated emission measurement.

The signal to noise ratio is improved by using pre-amplifier.

### 8.2.2.3 Spectrum Analyzer

The spectrum analyzer is used for preliminary measurement of frequency range 30 – 1000 MHz, and also used for final measurement of higher than 1000 MHz (Resolution bandwidth : 1 MHz).

### 8.2.2.4 EMI Test Receiver

The Quasi-peak detector(Resolution bandwidth : 120 kHz) built in test receiver is used for final measurement of the frequency 30 – 1000 MHz.

The test receiver is complied with the specification of the CISPR publication 16.

### 8.2.2.5 Turntable

The turntable is capable for EUT weight and rotatable 0 to 360 degree horizontally by remote control in the test room.

### 8.2.2.6 Antenna Mast

The antenna mast is attachable to all antennas described on clause 8.2.2.1 and antenna height is adjustable 1 to 4 meters continuously by remote control at the test room, and antenna polarization is also changed by the remote control.

## 8.2.3 Test Procedure

### 8.2.3.1 Preliminary Measurement

EUT is tested on all operating conditions.

The spectrum analyzer is set max-hold mode and swept during turntable was rotated 0 to 360 degree. Then spectrum chart are plotted out to detect the worst conditions in configuration, operating mode, or ambient noise notation.

### 8.2.3.2 Final Measurement

The EUT operated in the condition where maximum emission is detected in the preliminary test.

The turntable azimuth(EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured. The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.

When the uncertain result was obtained, the measurement is retried by using the half wave dipole antenna instead of the broadband antenna.

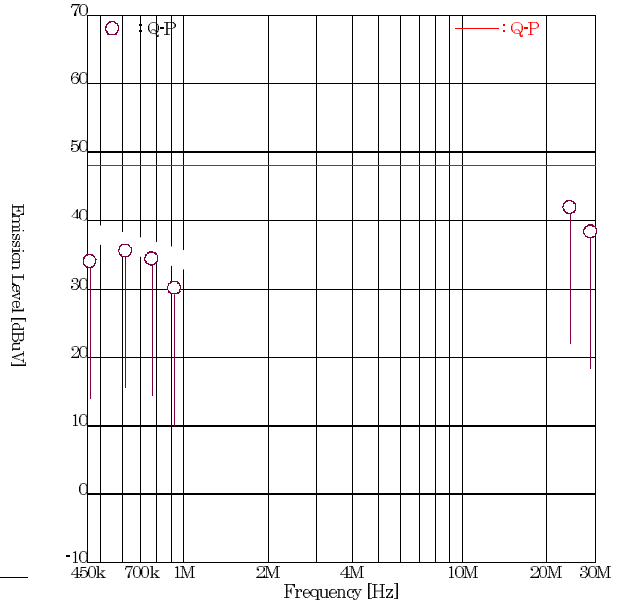
**SECTION 9. EVALUATION OF TEST RESULTS**

**9.1 Conducted Emission Test**

**9.1.1 Read mode**

**Akzo Kashima Limited**  
**Takegawa No.1 Test Site**  
**INTERFERENCE CONDUCTION TEST**

APPLICANT : RICOH COMPANY,LTD.  
 EUT NAME : CD-R/RW Drive  
 MODEL NO. : MP7120A  
 SERIAL NO. : DVT-216  
 TEST MODE : Read  
 POWER SOURCE : AC120V/60Hz  
 DATE TESTED : Apr 28 2000  
 FILE NO. : AKL-200027  
 REGULATION : FCC Part15B CLASS B  
 TEST METHOD : ANSI 63.4:1992



ENGINEER : Hiromi Muramatsu

FREQUENCY No	[MHz]	READING [dBuV]		FACTOR [dB]		EMISSION [dBuV]		LIMIT [dBuV]	MARGIN [dB]	
		Line1	Line2	Line1	Line2	Line1	Line2		Line1	Line2
1	0.4605	26.3	<u>27.7</u>	6.4	6.4	32.7	<u>34.1</u>	48.0	15.3	<u>13.9</u>
2	0.6157	28.5	<u>29.1</u>	6.5	6.5	35.0	<u>35.6</u>	48.0	13.0	<u>12.4</u>
3	0.7680	<u>27.9</u>	27.3	6.5	6.5	<u>34.4</u>	33.8	48.0	<u>13.6</u>	14.2
4	0.9234	<u>23.6</u>	23.0	6.5	6.5	<u>30.1</u>	29.5	48.0	<u>17.9</u>	18.5
5	24.2941	<u>33.9</u>	33.7	8.1	8.1	<u>42.0</u>	41.8	48.0	<b>6.0</b>	6.2
6	28.8067	30.0	<u>30.1</u>	8.3	8.3	38.3	<u>38.4</u>	48.0	9.7	<u>9.6</u>

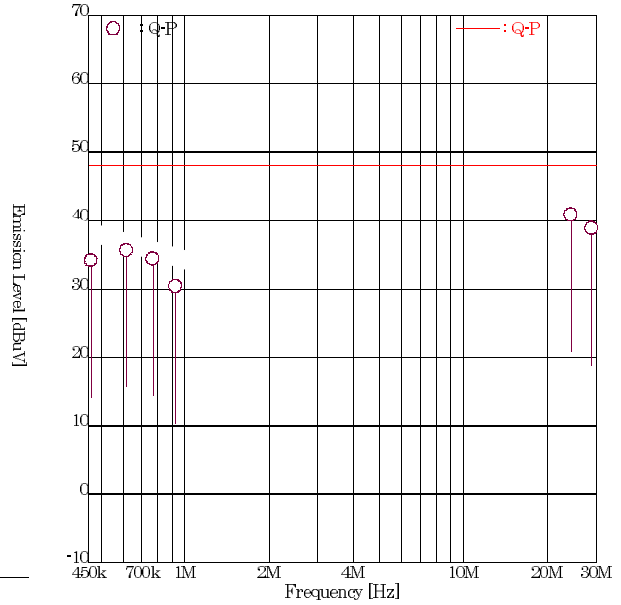
Higher six points are underlined.  
 Other frequencies : Below the FCC Part15B CLASS B limit  
 Emission Level = Read + Factor(LISN,Pad,Cable)



9.1.2 Write mode

**Akzo Kashima Limited**  
**Kakegawa No.1 Test Site**  
**INTERFERENCE CONDUCTION TEST**

APPLICANT : RICOH COMPANY,LTD.  
 EUT NAME : CD-R/RW Drive  
 MODEL NO. : MP7120A  
 SERIAL NO. : DVT-216  
 TEST MODE : Write  
 POWER SOURCE : AC120V/60Hz  
 DATE TESTED : Apr 28 2000  
 FILE NO. : AKL-200027  
 REGULATION : FCC Part15B CLASS B  
 TEST METHOD : ANSI 63.4:1992



ENGINEER : Hiromi Muramatsu

FREQUENCY No	[MHz]	READING [dBuV]		FACTOR [dB]		EMISSION [dBuV]		LIMIT [dBuV]	MARGIN [dB]	
		Line1	Line2	Line1	Line2	Line1	Line2		Line1	Line2
1	0.4595	26.4	<u>27.8</u>	6.4	6.4	32.8	<u>34.2</u>	48.0	15.2	<u>13.8</u>
2	0.6175	28.4	<u>29.2</u>	6.5	6.5	34.9	<u>35.7</u>	48.0	13.1	<u>12.3</u>
3	0.7679	<u>27.9</u>	27.4	6.5	6.5	<u>34.4</u>	33.9	48.0	<u>13.6</u>	14.1
4	0.9249	<u>23.9</u>	23.0	6.5	6.5	<u>30.4</u>	29.5	48.0	<u>17.6</u>	18.5
5	24.2811	<u>32.8</u>	32.5	8.1	8.1	<u>40.9</u>	40.6	48.0	<u>7.1</u>	7.4
6	28.7825	<u>30.6</u>	30.0	8.3	8.3	<u>38.9</u>	38.3	48.0	<u>9.1</u>	9.7

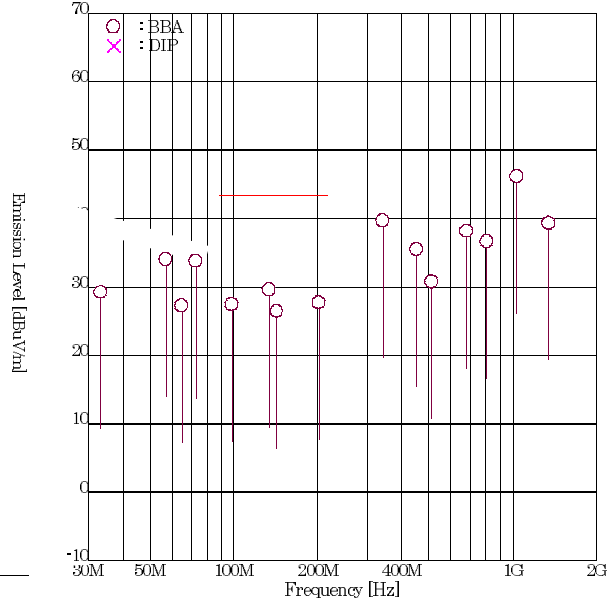
Higher six points are underlined.  
 Other frequencies : Below the FCC Part15B CLASS B limit  
 Emission Level = Read + Factor(LISN,Pad,Cable)

9.2 Radiated Emission Test

9.2.1 Read mode

**Akzo Kashima Limited**  
**Kakegawa No.1 Test Site**  
**INTERFERENCE RADIATION TEST**

APPLICANT : RICOH CO.,LTD.  
 EUT NAME : CD-R/RW Drive  
 MODEL NO. : MP7120A  
 SERIAL NO. : DVT-216  
 TEST MODE : Read  
 POWER SOURCE : AC120V/60Hz  
 DATE TESTED : Apr 28 2000  
 FILE NO. : AKL-200027  
 REGULATION : FCC Part15B CLASS B  
 TEST METHOD : ANSI 63.4-1992  
 DISTANCE : 3.0 [m]  
 TEMPERATURE : 20.0 [degC]  
 HUMIDITY : 55.0 [%]



ENGINEER : Hiromi Muramatsu

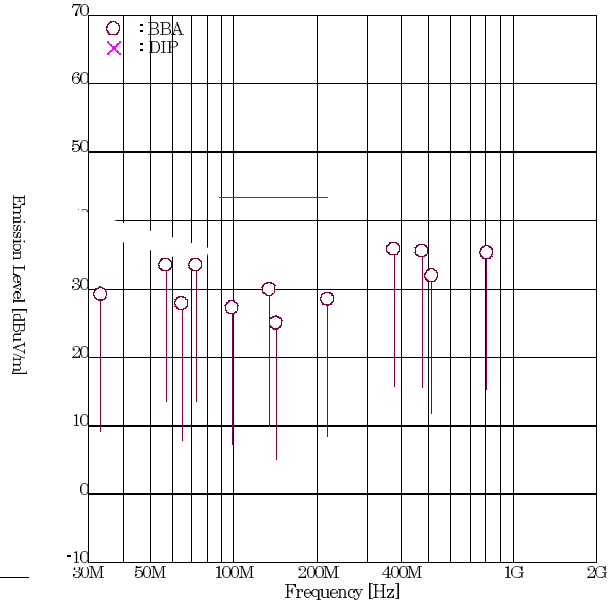
FREQUENCY No	[MHz]	ANT.	READING [dBuV]		FACTOR [dB]		EMISSION [dBuV/m]		LIMIT [dBuV/m]	MARGIN [dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	33.30	BBA	.	32.5	-3.2	-3.2	.	29.3	40.0	.	10.7
2	56.76	BBA	.	<u>41.3</u>	-7.2	-7.2	.	<u>34.1</u>	40.0	.	<u>5.9</u>
3	64.78	BBA	.	36.8	-9.5	-9.5	.	27.3	40.0	.	12.7
4	72.89	BBA	<u>45.6</u>	.	-11.8	-11.8	<u>33.8</u>	.	40.0	<u>6.2</u>	.
5	98.28	BBA	.	36.7	-9.3	-9.3	.	27.4	43.5	.	16.1
6	133.68	BBA	37.8	.	-8.2	-8.2	29.6	.	43.5	13.9	.
7	141.81	BBA	.	35.6	-9.1	-9.1	.	26.5	43.5	.	17.0
8	201.62	BBA	.	34.9	-7.2	-7.2	.	27.7	43.5	.	15.8
9	342.06	BBA	<u>41.2</u>	<u>34.8</u>	-1.5	-1.5	<u>39.7</u>	<u>33.3</u>	46.0	<u>6.3</u>	<u>12.7</u>
10	452.25	BBA	34.5	.	1.0	1.0	35.5	.	46.0	10.5	.
11	511.22	BBA	28.8	.	2.0	2.0	30.8	.	46.0	15.2	.
12	684.37	BBA	.	<u>32.2</u>	6.0	6.0	.	<u>38.2</u>	46.0	.	<u>7.8</u>
13	806.17	BBA	<u>28.7</u>	<u>29.1</u>	7.6	7.6	<u>36.3</u>	<u>36.7</u>	46.0	<u>9.7</u>	<u>9.3</u>
14	1038.33	BBA	<u>43.1</u>	<u>38.8</u>	3.1	3.1	<u>46.2</u>	<u>41.9</u>	53.9	<u>7.7</u>	<u>12.0</u>
15	1349.93	BBA	35.6	34.2	3.8	3.8	39.4	38.0	53.9	14.5	15.9

Higher six points are underlined.  
 Other frequencies : Below the FCC Part15B CLASS B limit  
 Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)  
 ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)

9.2.2 Write mode

**Akzo Kashima Limited**  
**Kakegawa No.1 Test Site**  
**INTERFERENCE RADIATION TEST**

APPLICANT : RICOH CO.,LTD.  
 EUT NAME : CD-R/RW Drive  
 MODEL NO. : MP7120A  
 SERIAL NO. : DVT-216  
 TEST MODE : Write  
 POWER SOURCE : AC120V/60Hz  
 DATE TESTED : Apr 28 2000  
 FILE NO. : AKL-200027  
 REGULATION : FCC Part15B CLASS B  
 TEST METHOD : ANSI 63.4-1992  
 DISTANCE : 3.0 [m]  
 TEMPERATURE : 20.0 [degC]  
 HUMIDITY : 55.0 [%]



ENGINEER : Hiromi Muramatsu

FREQUENCY No	[MHz]	ANT.	READING [dBuV]		FACTOR [dB]		EMISSION [dBuV/m]		LIMIT [dBuV/m]	MARGIN [dB]	
			Hori	Vert	Hori	Vert	Hori	Vert		Hori	Vert
1	33.16	BBA	.	<u>32.4</u>	-3.2	-3.2	.	<u>29.2</u>	40.0	.	<u>10.8</u>
2	56.76	BBA	.	<u>40.7</u>	-7.2	-7.2	.	<u>33.5</u>	40.0	.	<u>6.5</u>
3	64.76	BBA	.	37.4	-9.5	-9.5	.	27.9	40.0	.	12.1
4	72.89	BBA	<u>45.3</u>	.	-11.8	-11.8	<u>33.5</u>	.	40.0	<u>6.5</u>	.
5	98.28	BBA	.	36.6	-9.3	-9.3	.	27.3	43.5	.	16.2
6	133.58	BBA	38.2	.	-8.2	-8.2	30.0	.	43.5	13.5	.
7	141.71	BBA	.	34.1	-9.1	-9.1	.	25.0	43.5	.	18.5
8	216.29	BBA	.	34.8	-6.3	-6.3	.	28.5	46.0	.	17.5
9	373.60	BBA	<u>36.5</u>	.	-0.6	-0.6	<u>35.9</u>	.	46.0	<u>10.1</u>	.
10	471.87	BBA	<u>34.2</u>	30.5	1.4	1.4	<u>35.6</u>	31.9	46.0	<u>10.4</u>	14.1
11	511.22	BBA	29.9	.	2.0	2.0	31.9	.	46.0	14.1	.
12	806.17	BBA	<u>27.7</u>	27.1	7.6	7.6	<u>35.3</u>	34.7	46.0	<u>10.7</u>	11.3

Higher six points are underlined.  
 Other frequencies : Below the FCC Part15B CLASS B limit  
 Emission Level = Read + Factor(Antenna,Antenna Pad,Cable,Preamp)  
 ANT. : Used antenna(BBA = Broadband antenna, DIP = Dipole antenna)

### 9.3 Sample Calculations

#### 9.3.1 Conducted Emission

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Example @ 24.2941 MHz

$$\begin{array}{rcl} \text{Emission Level} & = & \text{Meter Reading} & 33.9 \text{ dBuV} \\ & & + \text{Factor} & \underline{+ 8.1 \text{ dB}} \\ & & & = 42.0 \text{ dBuV} \end{array}$$

$$\begin{array}{rcl} \text{Margin} & = & \text{Limit} & 48.0 \text{ dBuV} \\ & & - \text{Emission Level} & \underline{- 42.0 \text{ dBuV}} \\ & & & = 6.0 \text{ dB} \end{array}$$


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Factor = LISN Factor + Cable Loss + Pad Loss

#### 9.3.2 Radiated Emission

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Example @ 56.76 MHz

$$\begin{array}{rcl} \text{Emission Level} & = & \text{Meter Reading} & 41.3 \text{ dBuV} \\ & & + \text{Factor} & \underline{+ -7.2 \text{ dB}} \\ & & & = 34.1 \text{ dBuV/m} \end{array}$$

$$\begin{array}{rcl} \text{Margin} & = & \text{Limit} & 40.0 \text{ dBuV/m} \\ & & - \text{Emission Level} & \underline{- 34.1 \text{ dBuV/m}} \\ & & & = 5.9 \text{ dB} \end{array}$$


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Factor = Antenna Factor + Cable Loss – Amplifier Gain + Pad Loss  
– Distance Conversion Factor

## SECTION 10. PHOTOGRAPHS OF MAXIMUM EMISSION SET-UP

## 10.1 Conducted Emission Test

Test setup in accordance with ANSI C63.4-1992



Front view



Rear view

## 10.2 Radiated Emission Test

Test setup in accordance with ANSI C63.4-1992



Front view



Rear view

Note : Maintaining 10cm spacing between all the equipment cabinets.

## SECTION 11. INSTRUMENTS USED FOR FINAL TEST

Instrument	Model No.	Serial No.	Manufacturer	Last cal. date	Period
Amplifier (30M-1GHz)	8447D	2727A05325	HEWLETT PACKARD	Aug.25, 99	1 Year
Step attenuator (30M-1GHz)	8494A	1510A08521	HEWLETT PACKARD	Aug.25, 99	1 Year
Test receiver (0.45M-30MHz)	ESH2	880370/011	ROHDE & SCHWARZ	Mar.09, 00	1 Year
Test receiver (30M-1GHz)	ESV	881484/012	ROHDE & SCHWARZ	Mar.09, 00	1 Year
BICOG Antenna (30M-1GHz)	LPB-2513/A	1099	A.R.A.	Oct.29, 99	1 Year
LISN	ESH2-Z5	881493/017	ROHDE & SCHWARZ	Mar.24, 00	1 Year
LISN	KNW-242	8-579-23	Kyoritsu	Mar.13, 00	1 Year
6dB Attenuator (0.45M-30MHz)	090-0106A	002	Lynics	Aug.05, 99	1 Year
6dB Attenuator (30M-1GHz)	MP721B	M96832	ANRITSU	Jan.26, 00	1 Year
RF Switch	MP59B	M7575	ANRITSU	Dec.08, 99	1 Year
RF Switch	MP59B	M7736	ANRITSU	Dec.08, 99	1 Year
RF Switch	ACX-150-1	None	AKZO	Dec.08, 99	1 Year
Fuse	MP612A	None	ANRITSU	Dec.08, 99	1 Year
Coaxial cable (0.45M-30MHz)	RG-5A/U (7.1m)	C1	AKZO	Dec.08, 99	1 Year
Coaxial cable (0.45M-30MHz)	RG-5A/U (4.2 m)	C2	AKZO	Dec.08, 99	1 Year
Coaxial cable (0.45M-30MHz)	RG-5A/U (1.4m)	C3	AKZO	Dec.08, 99	1 Year
Coaxial cable (0.45M-30MHz)	RG-5A/U (1.6m)	C4	AKZO	Dec.08, 99	1 Year
Coaxial cable (30M-1GHz)	RG-5D-2W (16.5m)	R1	AKZO	Dec.08, 99	1 Year
Coaxial cable (30M-1GHz)	RG-177/U (13.3 m)	R2	AKZO	Dec.08, 99	1 Year
Coaxial cable (30M-1GHz)	RG-5A/U (2.7m)	R3	AKZO	Dec.08, 99	1 Year
Coaxial cable (30M-1GHz)	RG-5A/U (1.2 m)	R4	AKZO	Dec.08, 99	1 Year
Coaxial cable (30M-1GHz)	RG-5A/U (1.4 m)	R5	AKZO	Dec.08, 99	1 Year
Coaxial cable (30M-1GHz)	RG-5A/U (1.6 m)	R6	AKZO	Dec.08, 99	1 Year
Spectram Analyzer (1G-2GHz)	8563E	3821A09565	HEWLETT PACKARD	Mar.03, 00	1 Year
Double ridged guide antenna (1G-2GHz)	3115	9903-5699	EMCO	Mar.02, 00	1 Year
Amplifier (1G-2GHz)	8449B	3008A01182	HEWLETT PACKARD	Mar.03, 00	1 Year
6dB Attenuator (1G-2GHz)	8493C	18493	HEWLETT PACKARD	Mar.03, 00	1 Year
Suhner cable (1G-2GHz)	SUCOFLEX 104 (1.5m)	R8	SUHNER	Mar.03, 00	1 Year
Suhner cable (1G-2GHz)	SUCOFLEX 104 (6.0m)	R9	SUHNER	Mar.03, 00	1 Year
Site Attenuation				May.20, 99	1 Year

Note : Test instruments are calibrated according to Quality Manual and Calibration Rules of EMC division.

## SECTION 12. MEASUREMENT UNCERTAINTY

The uncertainty of the measurements performed for this report lies:

Radiated emission at 3m

30 MHz – 1000 MHz ..... +/- 3.6 dB

Above 1 GHz ..... +/- 3.9 dB

Conducted emission

9 kHz – 30 MHz ..... +/- 1.8 dB

Note on Radiated Emission measurement uncertainty

The following items are not included in the calculations in spite of their own uncertainty components because it is impracticable to find the value.

It is our problem awaiting solution in future.

(1) Repeatability of measurement

It is not possible to calculate repeatability since the measurement was carried out only one time.

(2) Antenna factor variation

The definition of measured (radiated electric field strength) is not completed on the referred standard(s).

(3) Loss of EUT radiation propagation

It is certainly one of the uncertainty components, however is not able to calculate.

Please note that these uncertainties are not reflected to the compliance judgement of the test results in this report.

## SECTION 13. VALIDITY OF TEST REPORT

- 13.1 The test result of this report is effective for equipment under test itself and under the test configuration described on the report.
- 13.2 This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.
- 13.3 This test report shall not be reproduced except in full, without issuer's permission.



## SECTION 14. DESCRIPTION OF TEST LABORATORY

### 14.1 Outline of Akzo Kashima Limited, EMC Division

Akzo Kashima Ltd. was established in 1975 for manufacturing specialty chemicals. The shares are owned by Akzo Nobel KK (70%), the country organization in Japan for Akzo Novel nv., and TOSOH Corporation (30%), one of the leading petrochemical manufacturers in Japan. Akzo Nobel, headquartered in the Netherlands, is one of the world's leading companies in selected areas of chemicals, coatings, healthcare products and fibers with work force of approximately 70,000 people in over 50 countries.

In 1984, in order to respond to the growing testing demand, in particular, for FCC filing, Akzo Kashima started EMI testing business, installing the first open air test site in Kashima, Ibaraki prefecture. Further the business has been expanded by installing additional testing facilities not only in Kashima but also in other areas such as Shizuoka, Nagano, Kanagawa and Tochigi. As results, Akzo Kashima has now 16 open air test sites and 4 anechoic chambers for EMI/EMC testing. As the largest EMC testing laboratory in number of testing facilities and staffs, EMC Division has been organized separately in the company and independently operated in conformity with the requirements of ISO Guide 25 (EN 45000) for its competency as a testing laboratory.

Akzo Kashima EMC Division is the first foreign private laboratory accredited by NVLAP, National Voluntary Laboratory Accreditation Program-NIST, USA. The division has been certified, authorized and/or filed as a competent testing laboratory by various testing organizations/authorities as described below.

### 14.2 Filing, certification, authorization and accreditation list

<u>EMI/EMC testing</u>		<u>Telecommunications terminal testing</u>	
FCC	(USA)	FCC	(USA)
NVLAP	(USA)	NVLAP	(USA)
NEMKO	(Norway)	NATA	(Australia)
VCCI	(Japan)	IC	(Canada)
NMi	(The Netherlands)		
TÜV PRODUCT SERVICE	(Germany)		

Note : NVLAP accreditation does not constitute any product endorsement by NVLAP or any agent of the U.S. Government.