EMISSION TEST REPORT

Test Report No. : 18C0031-02-2
Yamaha Corporation
Model: CRW 6416S / CRW 6416S-NB
FCC Part 15 Subpart B

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2. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

3. This equipment is in compliance with above regulation. We hereby certify that the data are contain a true representation of the emission profile.

4. The results in this report apply only to the sample tested.

5. This test report clearly shows that CD-Rewritable Drive, CRW 6416S / CRW6416S-NB is in compliance with FCC Part 15 Subpart B Class B, specification.

Date of test: March 17, 1999 **Issued date:** March 24, 1999

Tested by: _____ **Approved by:** _____

Naoki Sakamoto
EMC section

Kazutoyo Nakanishi
Group Leader of EMC section

Form Version No. 1

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1 GENERAL INFORMATION

APPLICANT	: Yamaha Corporation
ADDRESS	: 10-1 Nakazawa-cho, Hamamatsu-shi, Shizuoka-ken, 430-8650 Japan Tel: +81-539-62-5348 Fax: +81-539-62-5138
REGULATION(S)	: FCC Part 15 Subpart B, Class B
MODEL NUMBER	: CRW 6416S / CRW 6416S-NB
SERIAL NUMBER	: Z000055
KIND OF EQUIPMENT	: CD-Rewritable Drive
TESTED DATE	: March 17, 1999
RECEIPT DATE OF SAMPLE	: March 17, 1999
TEST REPORT NUMBER	: 18C0031-02-2
TEST SITE	: A-PEX Yokowa NO.3 Open Test Site

1.1 Product Description

Yamaha Corporation, Model: CRW 6416S (referred to as the EUT in this report) is a CD-Rewritable Drive.

The clock frequency used in the EUT is 33.68MHz.

1.2 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Model	FCC ID	Description	Cable description	Backshell Material
(1) YAMAHA M/N: CRW 6416S S/N: Z000055 (EUT)	A6R11F59	CD-Rewritable Drive	-	
(2) Digital M/N: PC766 FR-766 JA-3C S/N: TB42124910	AO9-PC76X	Personal Computer	Unshielded AC Power Cable	P.V.C.
(3) Sony M/N: MDR-35	N/A	Headhopne	Unshielded Headphone Cable	P.V.C.
(4) Digital M/N: PCXAJ-AA S/N: TB40713659	N/A	Keyboard	Shielded Keyboard Cable	P.V.C.
(5) Digital M/N: M-S28 S/N: LT40717616	DZL210513	Mouse	Shielded Mouse Cable	P.V.C.
(6) DELL M/N: D1526T-HS S/N: 2009513	AK8CPD15SF1	CRT	Unshielded AC Power Cable Shielded Video Cable	P.V.C. P.V.C.
(7) EPSON M/N:P18MA S/N: OFG1007634	BKM5DEP18MA	Printer	Shielded Printer Cable Unshielded AC Power Cable	P.V.C. P.V.C.
(8) EPSON M/N: C202A S/N: 10309	BKM552C202A	Modem	Shielded RS-232C Cable	P.V.C.
(9) EPSON M/N: H00CAA S/N: 022754	N/A	AC Adapter	Unshielded DC Power Cable	P.V.C.
(10)ADAPTEC M/N: AHA-1542CF S/N: BDOE4360S07	FGT1542CF	SCSI Board	-	

1.3 Tested Methodology

Both conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4(1992).
Radiated testing was performed at a distance of 3 meters from the antenna to EUT .

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 108 Yokowa-cho, Ise-shi, Mie-ken 516-1106 Japan.
This site has been fully described in a report dated Aug. 1, 1997 submitted to FCC office, and accepted in a letter dated Sep. 16, 1997 (31040/SIT 1300F2).

2 SYSTEM TEST CONFIGURATION

2.1 Operation Environment

	Conduction	Radiation
Temperature	: 24	: 23
Humidity	: 50%	: 62%
Power supply	: AC 120V/60Hz	: AC 120V/60Hz

2.2 Justification

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

2.3 EUT Exercise Software

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.

The sequence is used:

Operation: Reading mode x 16
Writing mode x 6 (CD-W)
Writing mode x 4 (CD-RW)

Reading : Playback the recorded CD then display “H” on the CRT display continuously.
Writing : Write the data to CD four or six times speed.
Flash “W” on the CRT display.

2.4 Test Procedure

2.4.1 Tabletop Equipment Conducted Emissions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
The rear of tabletop was located 40cm to the vertical conducting plane.
The rear of EUT, including peripherals aligned and flush with rear of tabletop.
All other surfaces of tabletop was at least 80cm from any other grounded conducting surface.
I/O cables and AC cables that were connected to the peripherals were bundled in center.
They were folded back and forth 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, were individually connected through a LISN to the input power source.
All unused 50 connectors of the LISN were resistively terminated in 50 when not connected to the measuring equipment.

2.4.2 Tabletop Equipment Radiated Emissions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
The rear of EUT, including peripherals was aligned and flush with rear of tabletop.
I/O cables that were connected to the peripherals were bundled in center.
They were folded back and forth forming a bundle 30cm to 40cm long and were hanged 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.
The measurement distance was 3m.

Figure2.1 Configuration of Tested System

Front View

* Cabling was taken into consideration and test data was taken under worst case conditions.

Top View

* Cabling was taken into consideration and test data was taken under worst case conditions.

3 CONDUCTED AND RADIATED MEASUREMENT PHOTOS

Figure 3.1 Conducted Measurement Photos

Figure 3.2 Radiated Measurement Photos

3.1 Measurement Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was 3.3dB.

The data listed in this test report may exceed the test limit because it does not have enough margin (more than 3.3dB).

The data listed in this test report has enough margin, more than 3.3dB.

Conducted Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was 2.0dB.

The data listed in this test report may exceed the test limit because it does not have enough margin (more than 2.0dB).

The data listed in this test report has enough margin, more than 2.0dB.

4 CONDUCTED EMISSION DATA

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range(450KHz-30MHz).
The final data represents worst-case emissions. (Reading, X16 speed)
The minimum margin to the limit is as follows :

Frequency (MHz)	Line (N/L)	Measured (dBV)	LISN Factor(dB)	Result (dBV)	Limit (dBV)	Margin
11.0740	N	47.2	-3.2	44.0	48.0	4.0

* All readings are quasi-peak mode.
* LISN Factor = include Cable loss, AMP gain and Attenuator

5 RADIATED EMISSION DATA

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range(30MHz-1000MHz).
The final data was reported in the worst-case emissions. (Reading, X16 speed)
The minimum margin to the limit is as follows :

Frequency (MHz)	Receiver Reading (dBV)	Correction Factor (dBV)	Field Strength (dBV/m)	Limit (dBV/m)	Margin (dBV)
56.83	46.7	-11.0	35.7	40.0	4.3

* All readings are quasi-peak mode.

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5.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor and Antenna Pad, and subtracting the Amplifier Gain from the measured reading. The sample calculation is as follows :

FS = RA + AF + CF + AT - AG

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AT = Antenna Pad
AG = Amplifier Gain

Assume a receiver reading of 46.7 dBV is obtained. The antenna Factor of 8.7 dB, Cable Factor of 1.9 dB and Antenna Pad of 6.0 dB is added. The Amplifier Gain of 27.6 dB is subtracted, giving a field strength of 35.7 dBV/m.

FS = 46.7 + 8.7 + 1.9 + 6.0 - 27.6 = 35.7dBV/m

6 TEST EQUIPMENT USED

INSTRUMENTS	Mfr.	MODEL	C/N	Calibrated Until
Pre Amplifier	Hewlett Packard	8447D	AF1	June 10, 1999
Pre Amplifier	Hewlett Packard	8449B	AF5	August 1, 1999
Biconical Antenna	Schwarzbeck	BBA9106	BA1	May 3, 1999
Biconical Antenna	Schwarzbeck	BBA9106	BA2	July 6, 1999
Biconical Antenna	Schwarzbeck	BBA9106	BA5	July 6, 1999
Logperiodic Antenna	Schwarzbeck	UHALP9108-A	LA6	February 14, 2000
Logperiodic Antenna	Schwarzbeck	UKLP9140-ALA8		May 3, 1999
Horn Antenna	AH System, Inc	SAS-200/571	YTSPA1	September 22, 1999
LISN	Rohde & Schwarz	ESH2-Z5	LS1	November 24, 1999
LISN	Rohde & Schwarz	ESH3-Z5	LS2	November 24, 1999
LISN	Schwarzbeck	NSLK8127	LS3	November 24, 1999
LISN	Rohde & Schwarz	ESH3-Z5	LS4	November 24, 1999
LISN	Schwarzbeck	NNLK8121	LS5	November 24, 1999
LISN	Rolf Heine	NNB-4/200	LS6	November 24, 1999
LISN	Schwarzbeck	NNLK8126	LS7	November 24, 1999
Spectrum Analyzer	Hewlett Packard	8567A	SA1	May 31, 1999
Spectrum Analyzer	Hewlett Packard	8567A	SA4	June 12, 1999
Spectrum Analyzer	Advantest	R3271	SA5	May 17, 1999
Test Receiver	Rohde & Schwarz	ESHS-20	TR1	April 3, 1999
Test Receiver	Rohde & Schwarz	ESVS-30	TR2	July 5, 1999
Test Receiver	Rohde & Schwarz	ESHS-30	TR3	July 14, 1999
Test Receiver	Rohde & Schwarz	ESVS-10	TR4	July 14, 1999
Test Receiver	Rohde & Schwarz	ESHS-10	TR5	March 23, 1999
Test Receiver	Rohde & Schwarz	ESVS-10	TR6	March 23, 1999

indicates EMI Test Equipment used.

*All measurement equipment is traceable to national standard.

APPENDIX

A : Test Data

Conducted emissions

Reading X16 speed	: A1 to A3
Writing X6 speed (CD-W)	: A4 to A6
Writing X4 speed (CD-RW)	: A7 to A9
Standby	: A10

Radiated emissions

Reading X16 speed	: A11 to A12
Writing X6 speed (CD-W)	: A13 to A14
Writing X4 speed (CD-RW)	: A15 to A16

B: Declaration of Conformity B1

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