

TEST REPORT

Report No.: Z01C-00330

Issue Date: October 10, 2000

The device, as described herewith, was tested pursuant to applicable test procedure indicated below and complies with the requirements of;

FCC Part15 Subpart B, Class B

The EUT complies with section 15.37 "Transition provision for compliance with the rules".
The test results are traceable to international or national standards.

Applicant	: Sanyo Electric Co., Ltd. Information Products Division 1-1-1, Sakata, Oizumi-machi Ora-gun, Gunma-ken 370-0596 Phone: +81-276-61-8006 Fax.: +81-276-61-8752
Equipment under test (EUT)	: CD-RW Drive
FCC ID	: JBQCDR020
Trade Name	: SANYO
Model Number	: CRD-BP4
Serial Number	: 38900004
EUT Condition	: Pre-production

Test procedure : ANSI C63.4-1992
Date of test : October 5, 2000
Test place : Site 2
Test results : Complied

Zacta Technology Corporation certifies that no party to the application is subject to a denial of federal benefits, that include FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21U.S.C. 853(a).

The results in this report are applicable only to the samples tested.
This report shall not be re-produced except in full without the written approval of ZACTA Technology Corporation.

Test performed by: Yuki Shindo / EMC engineer

Authorized by: Kiyoshi Endo / Manager of Technical Division



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1. Equipment description

1.1 EUT information

No.	EUT	Company	Model No.	Serial No.	FCC ID/DoC	Comment
1	CD-RW Drive	SANYO	CRD-BP4	38900004	JBQCDR020	-

Max. used frequency : 33.86MHz

Oscillator(s)/Crystal(s) : 20.0MHz, 33.8MHz

Operating frequency

Power ratings : DC +5V, +12V
[EUT is powered from Host PC.
Power supply for Host PC in testing was AC 120V 60Hz.]

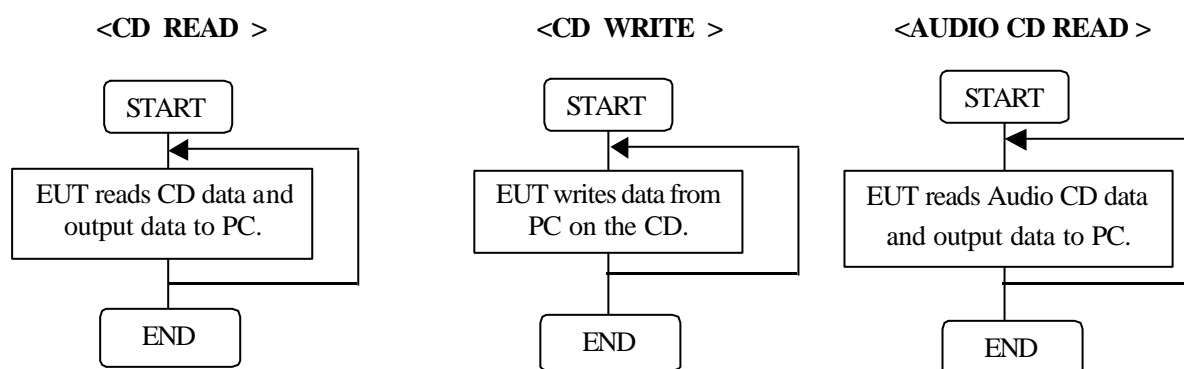
Port(s) : Headphones jack
Audio connector
SCSI connector
DC connector (DC input)

Size : (W) 146 x (H) 41.3 x (D) 188.5 mm

Operating mode : CD READ mode
CD WRITE mode
AUDIO CD READ mode

Variation of model(s) : Not applicable

1.2 Operating flow



2. Configuration information

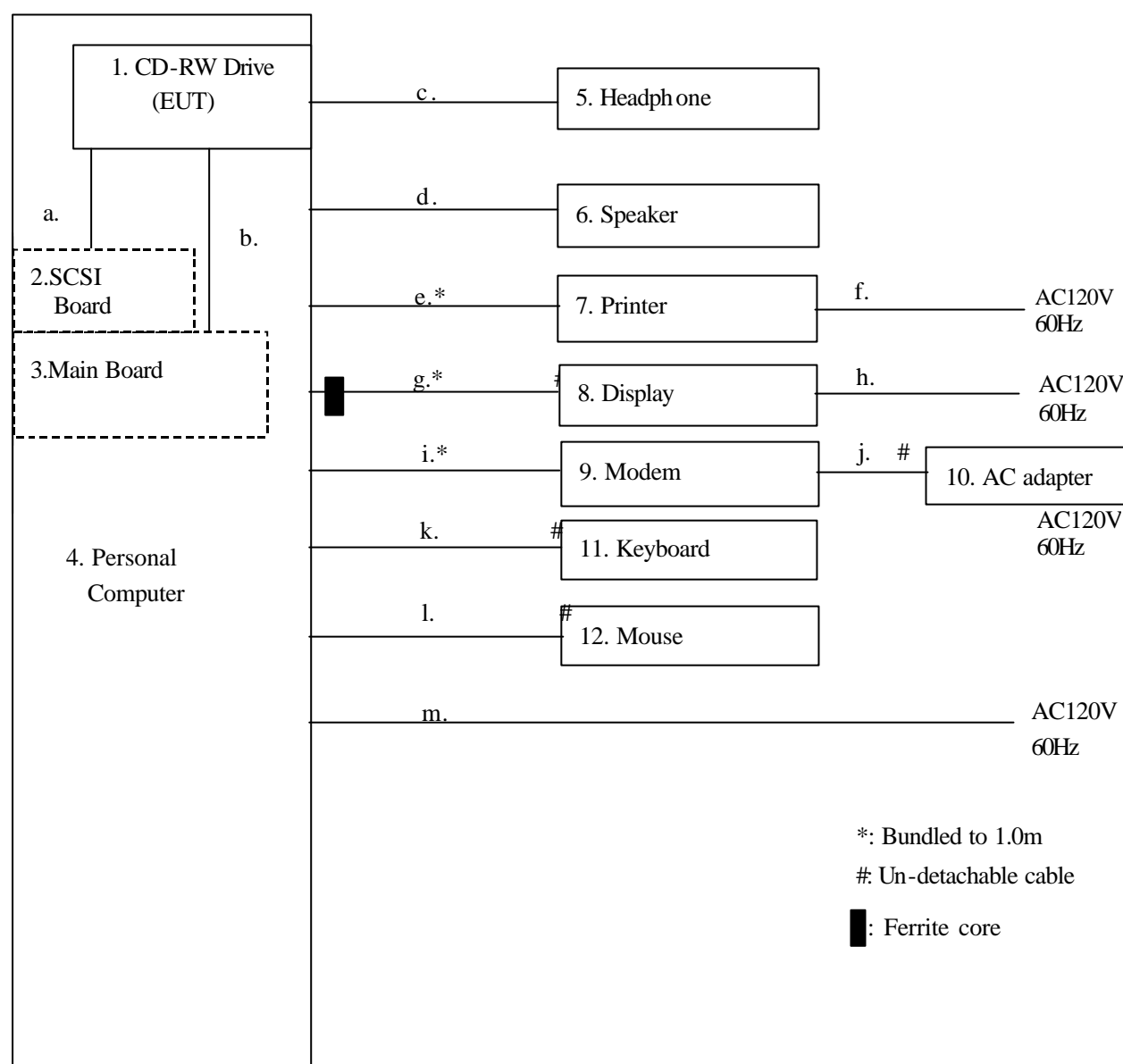
2.1 Peripheral(s) information

No.	Equipment	Company	Model No.	Serial No.	DoC / FCC ID	Comment
2	SCSI board	Adaptec	AHA-2940	BB0E64705T3	FGTAHA2940	-
3	Main board	COMPAQ	N/A	N/A	N/A	-
4	Personal Computer	COMPAQ	3590	238334-001	CNT75MEZ6	-
5	Headphone	FISHER	N/A	N/A	N/A	-
6	Speaker	Panasonic	RP-SP30	N/A	N/A	-
7	Printer	HP	C4555A	SG69A1425N	B94C4555X	-
8	Display	Goldstar	Studio Works 56i	15005G004960	BEJCS585	-
9	Modem	US Robotics	839	000839032BK6YV4J	DoC	-
10	AC adapter for Modem	US Robotics	N/A	N/A	N/A	-
11	Keyboard	COMPAQ	Enhanced III Keyboard	140536-101	AQ6ZG-CCC	-
12	Mouse	Microsoft	PS/2 Compatible Mouse	858487	C3K76FPS26C	-

2.2 Cable(s) information

No.	Cable	Length [m]	Shield	Connector	From	To	Comment
a	SCSI cable	0.4	Unshielded	Plastic	EUT	SCSI board	-
b	Audio cable	0.4	Unshielded	Plastic	EUT	Main board	-
c	Headphone cable	2.0	Unshielded	Metal	EUT	Headphone	-
d	Speaker cable	1.0	Unshielded	Metal	PC	Speaker	-
e	Centronics cable	2.0	Shielded	Metal	PC	Printer	Bundled excess cable.
f	AC power cord for Printer	2.0	Shielded	Plastic	Printer	AC outlet	-
g	Video cable	1.5	Shielded	Metal	PC	Display	Bundled excess cable.
h	AC power cord for Display	2.2	Unshielded	Plastic	Display	AC outlet	-
i	RS232C cable	2.0	Shielded	Metal	PC	Modem	Bundled excess cable.
j	DC cable for Modem AC adapter	2.0	Unshielded	Metal	Modem	AC adapter	-
k	Keyboard cable	1.5	Unshielded	Metal	PC	Keyboard	Coiled
l	Mouse cable	1.5	Unshielded	Metal	PC	Mouse	-
m	AC power cord for PC	2.0	Shielded	Plastic	PC	AC outlet	-

2.3 System configuration



Note 1: Numbers assigned to equipment or cables on this diagram are corresponded to the list in “1.1 EUT information”, “2.1 Peripheral(s) information” and “2.2 Cable(s) information”.

Note 2: Display is certified with the molded ferrite core on cable (No.g). I/F cable is Un-detachable and ferrite core is not added during testing

3. Test procedure

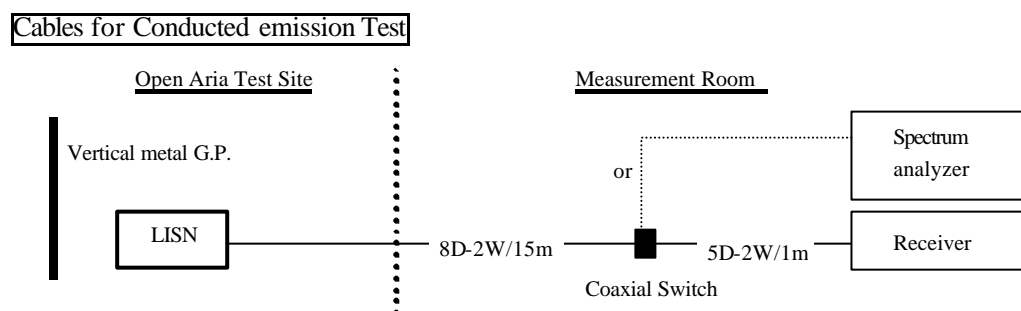
3.1 Description of Conducted Emission testing

Conducted emission testing is performed using test receiver. The detector function of the receiver is set to CISPR quasi-peak mode and the bandwidth is set to 9kHz. The frequency range from 450kHz to 30 MHz is scanned, and six highest emissions (Min.) are reported. The test results represent the worst-case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation.

EUT and support equipment is on a 1 meter x 1.5 meter surface, 0.8-meter height wooden table that is placed 40 cm away from the vertical metal ground plane.

Conducted emission of Host PC was tested because EUT is powered from Host PC. 50 Ω /50 μ H Line Impedance Stabilization Network (LISN) are 80cm away from the Host PC and placed on the conducting ground plane. LISN for peripheral is terminated in 50 Ω .

Sufficient time for the EUT, support equipment and test equipment are allowed in order for them to warm up to their normal operating condition.



3.2 Test equipment for Conducted emission

Equipment	Company	Model No.	Serial No.	Calibration date	Period
Spectrum analyzer	Agilent Technologies	8568B	2732A03847	Aug. 2000	1 year
Test Receiver	Rohode&Schwarz	ESHS10	842884/009	Oct. 1999	1 year
Line Impedance Stabilization Network for DC power supply	Kyoritsu Electrical Works, Ltd.	KNW-242C	8-1096-3	Feb. 2000	1 year
Line Impedance Stabilization Network for Peripheral	Kyoritsu Electrical Works, Ltd.	KNW-242C	8-875-19	Mar. 2000	1 year
50 Ω terminator	Agilent Technologies	11593A	N/A	Aug. 2000	1 year
Coaxial cable	FUJIKURA	8D-2W/15m 5D-2W/1m	H120601#2/C	Jun. 2000	1 year
Coaxial Switch	ANRITSU	MP59B	M26050	Jun. 2000	1 year

The above equipment calibration is traceable to NIST or an equivalent standards reference organization.

3.3 Description of Radiated emission testing

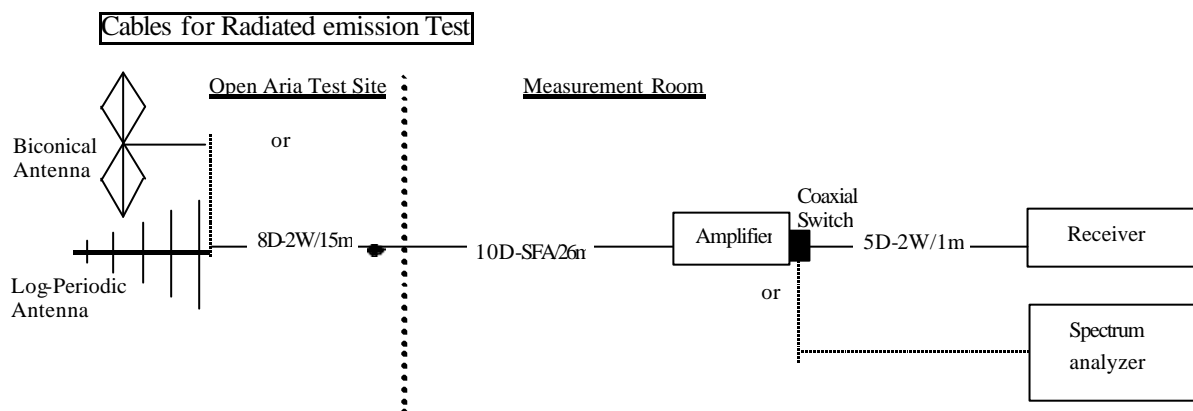
Radiated emission testing is performed at 3m distance using broadband antenna (Biconical antenna and log-periodic antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission. Frequency Range: 30MHz –1GHz is scanned and investigated using receiver, and above 1GHz, using spectrum analyzer. The detector function of the test receiver is set to CISPR Quasi-peak mode and the bandwidth is set to 120kHz.

The EUT and support equipment are placed on a 1 meter x 1.5 meter surface, 0.8 meter height wooden table. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission.

Interconnecting cables, which hanging closer than 40cm to the horizontal metal ground plane are bundled its excess in center. Six highest emissions (Min.) are reported. The test results represent the worst-case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation.

Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

The highest frequency used in the EUT is 33.86MHz, therefore, the frequency range is investigated from 30MHz up to the frequency 1GHz, as specified in CFR section 15.33.



3.4 Test equipment for Radiated emission

Equipment	Company	Model No.	Serial No.	Calibration date	Period
Spectrum analyzer	Agilent Technologies	8568B	2732A03847	Aug. 2000	1 year
RF Preamplifier	Anritsu	MH648A	M96157	Aug. 2000	1 year
Test Receiver	Kyoritsu Electrical Works, Ltd.	KNM-5002 KCV-6002	4N-187-10 4-257-1	Nov. 1999	1 year
Biconical Antenna	Schwarzbeck	BBA9106/VHA9103LE	02130879	Jun. 2000	1 year
Log Periodic Antenna	EMCO	3146	8901-2332	Jun. 2000	1 year
Coaxial cable	FUJIKURA	8D-2W/15m 10D-SFA/26m 5D-2W/1m	H120601#2/R3	Jun. 2000	1 year
Coaxial Switch	ANRITSU	MP59B	M26050	Jun. 2000	1 year
Site attenuation	ZACTA Technology Corp.	Site 2	N/A	Dec.1999	1 year

Calibration is traceable to NIST or an equivalent standards reference organization.

4. Laboratory description

4.1 Description for Test Site

1. Location: ZACTA Technology Corporation Yonezawa Testing Center
4149-7 Hachimanpara 5-chome Yonezawa-shi Yamagata 992-1128 Japan
Phone: +81-238-28-2880 Fax: +81-238-28-2888

2. The Number and Type of Site:

Site name: Site 1, Site 2 and Site 3 - Total 3 sites.
Site type : Whether protected site
*3m/10m Radiated emission & Conducted emission testing can be performed on each site

3. Facility filing information:

1) FCC site filing: Pursuant to CFR47 § 2.948

Site name	Final filing date
Site 1, Site 2 and Site 3	March 6, 2000

2) VCCI site filing: Pursuant to V-5/99.05 VCCI Regulations for Registration of measurement facilities

Site name	Radiated emission Registration No.	Conducted emission Registration No.	Duration of Registration
Site 1	R-136	C-132	September 30, 2003
Site 2	R-137	C-133	September 30, 2003
Site 3	R-138	C-134	September 30, 2003

3) NVLAP Accreditation:

NVLAP Lab. code: **200306-0**

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

4.2 Uncertainty

Total Uncertainty @95%min. Confidence probability

± 1.78dB

• • • For Conducted Emission

± 2.66dB

• • • For 3m Radiated Emission

± 2.01dB

• • • For 10m Radiated Emission

5. Results of the measurements

5.1 Results of the measurements

The minimum margins to the limits are as follows.

Conducted emission	Margin	Frequency	Detector	Operating mode	Data sheet
	8.6dB	11.480MHz	Quasi-peak	CD WRITE mode	No. 2

Radiated emission	Margin	Frequency	Antenna Height	Antenna Polarity	Table degree	Operating mode	Data sheet
	3.1dB	232.42MHz	1.2m	Horizontal	40 °	CD READ mode	No. 4

5.2 Deviation from the standard

Not applicable.

5.3 Sample of field strength calculation

Conducted Emission [Sample Calculation] $\text{dB } \mu\text{V} = 20\log_{10}(\mu\text{V})$

Class B
Limit @3.332MHz = 250 μV = 48.0dB μV
Reading = 41.6dB μV Cable Loss + LISN Factor = 0.2 + 0.5 = 0.7dB Total = 41.6 + 0.7 = 42.3dB μV
Margin = 48.0 - 42.3 = <u>5.7dB</u>

Radiated Emission [Sample Calculation] $\text{dB } \mu\text{V/m} = 20\log_{10}(\mu\text{V/m})$

Class B
Limit @147.6MHz = 150 $\mu\text{V/m}$ = 43.5dB $\mu\text{V/m}$
Reading = 42.8dB μV Ant. Factor + Cable Loss - Amp. Gain = 14.2 + 3.0 - 30.0 = -12.8dB Total = 42.8 - 12.8 = 30.0dB $\mu\text{V/m}$
Margin = 43.5 - 30.0 = <u>13.5dB</u>

6. Test Data

***** CONDUCTION MEASUREMENTS *****

STANDARD : FCC Part15 SubpartB
CLASS : B

SHEET NO. : 1

DATE OF TEST : 2000/10/5
TEST SITE : 2
TEMP. [] : 20.0
HUMIDITY [%] : 50.0
OPERATOR : Y.Shindo
COMPANY NAME: Sanyo Electric Co., Ltd.
EUT : CD-RW Drive
MODEL NO. : CRD-BP4
SERIAL NO. : 38900004
TEST MODE : CD READ
NOTE :

[QUASI-PEAK] FREQUENC [MHz]	READING		FACTOR [dB]	EMISSION LEVEL		LIMIT [dB μ V]	MARGIN [dB]	NOTE
	LINE A [dB μ V]	LINE B [dB μ V]		LINE A [dB μ V]	LINE B [dB μ V]			
0.602	35.1	34.0	0.1	35.2	34.1	48.0	12.8	
1.887	35.0	33.1	0.2	35.2	33.3	48.0	12.8	
6.487	34.2	32.6	0.3	34.5	32.9	48.0	13.5	
10.533	38.0	37.3	0.5	38.5	37.8	48.0	9.5	
11.480	38.7	38.9	0.5	39.2	39.4	48.0	8.7	*
12.014	38.0	36.2	0.5	38.5	36.7	48.0	9.5	

* : The worst emission.

FACTOR LISN Factor + Cable Loss

Ver.1.10 F2#005

***** CONDUCTION MEASUREMENTS *****

STANDARD : FCC Part15 SubpartB
CLASS : B

SHEET NO. : 2

DATE OF TEST : 2000/10/5
TEST SITE : 2
TEMP. [] : 20.0
HUMIDITY [%] : 50.0
OPERATOR : Y.Shindo
COMPANY NAME: Sanyo Electric Co., Ltd.
EUT : CD-RW Drive
MODEL NO. : CRD-BP4
SERIAL NO. : 38900004
TEST MODE : CD WRITE
NOTE :

[QUASI-PEAK] FREQUENC [MHz]	READING		FACTOR [dB]	EMISSION LEVEL		LIMIT [dB μV]	MARGIN [dB]	NOTE
	LINE A [dB μV]	LINE B [dB μV]		LINE A [dB μV]	LINE B [dB μV]			
0.605	34.2	33.4	0.1	34.3	33.5	48.0	13.7	
1.895	34.0	31.3	0.2	34.2	31.5	48.0	13.8	
6.481	34.2	32.5	0.3	34.5	32.8	48.0	13.5	
10.530	37.8	37.3	0.5	38.3	37.8	48.0	9.7	
11.480	38.7	38.9	0.5	39.2	39.4	48.0	8.6	*
12.011	37.4	37.4	0.5	37.9	37.9	48.0	10.1	

* : The worst emission.

FACTOR LISN Factor + Cable Loss

Ver.1.10 F2#005

***** CONDUCTION MEASUREMENTS *****

STANDARD : FCC Part15 SubpartB
CLASS : B

SHEET NO. : 3

DATE OF TEST : 2000/10/5
TEST SITE : 2
TEMP. [] : 20.0
HUMIDITY [%] : 50.0
OPERATOR : Y.Shindo
COMPANY NAME: Sanyo Electric Co., Ltd.
EUT : CD-RW Drive
MODEL NO. : CRD-BP4
SERIAL NO. : 38900004
TEST MODE : AUDIO CD READ
NOTE :

[QUASI-PEAK] FREQUENC [MHz]	READING		FACTOR [dB]	EMISSION LEVEL		LIMIT [dB μV]	MARGIN [dB]	NOTE
	LINE A [dB μV]	LINE B [dB μV]		LINE A [dB μV]	LINE B [dB μV]			
0.604	33.7	34.6	0.1	33.8	34.7	48.0	13.3	
1.887	34.6	33.3	0.2	34.8	33.5	48.0	13.2	
6.485	35.6	32.6	0.3	35.9	32.9	48.0	12.1	
10.533	38.6	36.9	0.5	39.1	37.4	48.0	8.9	*
11.482	37.8	38.1	0.5	38.3	38.6	48.0	9.4	
12.011	36.5	36.6	0.5	37.0	37.1	48.0	10.9	

* : The worst emission.

FACTOR LISN Factor + Cable Loss

Ver.1.10 F2#005

***** RADIATION MEASUREMENTS *****

STANDARD : FCC Part15 SubpartB
 CLASS : B
 DISTANCE [m] : 3
 DATE OF TEST : 2000/10/5
 TEST SITE : 2
 TEMP. [] : 20.0
 HUMIDITY [%] : 50.0
 OPERATOR : Y.Shindo
 COMPANY NAME: Sanyo Electric Co., Ltd.
 EUT : CD-RW Drive
 MODEL NO. : CRD-BP4
 SERIAL NO. : 38900004
 TEST MODE : CD READ
 NOTE :

SHEET NO. : 4

ANTENNA		TABLE	READING		FACTOR	EMISSION	LIMIT	MARGIN	NOTE
POL.	HEIGHT	RADIAN	FREQUENCY	LEVEL		LEVEL			
HOR/VER	[m]	[Deg.]	[MHz]	[dB μ V]	[dB μ V/m]	[dB μ V/m]	[dB μ V/m]	[dB]	
HOR	4.0	130	60.16	49.3	-19.4	29.9	40.0	10.1	
VER	1.0	245	60.16	53.2	-19.4	33.8	40.0	6.2	
HOR	4.0	125	66.40	45.2	-20.9	24.3	40.0	15.7	
VER	1.0	35	66.41	46.2	-20.9	25.3	40.0	14.7	
HOR	3.0	290	67.77	55.2	-21.1	34.1	40.0	5.9	
HOR	3.2	350	99.60	57.3	-17.9	39.4	43.5	4.1	
VER	1.0	230	99.60	48.4	-17.9	30.5	43.5	13.0	
HOR	1.2	40	232.42	52.1	-9.2	42.9	46.0	3.1	*
HOR	1.0	300	314.86	50.5	-10.1	40.4	46.0	5.6	
VER	1.0	290	464.81	42.9	-8.1	34.8	46.0	11.2	
VER	1.0	10	661.69	36.2	-3.7	32.5	46.0	13.5	

* : The worst emission.

FACTOR Antenna Factor + Cable Loss - Amp Gain

Ver.1.10 F2#005

***** RADIATION MEASUREMENTS *****

STANDARD : FCC Part15 SubpartB
 CLASS : B
 DISTANCE [m] : 3
 DATE OF TEST : 2000/10/5
 TEST SITE : 2
 TEMP. [] : 20.0
 HUMIDITY [%] : 50.0
 OPERATOR : Y.Shindo
 COMPANY NAME: Sanyo Electric Co., Ltd.
 EUT : CD-RW Drive
 MODEL NO. : CRD-BP4
 SERIAL NO. : 38900004
 TEST MODE : CD WRITE
 NOTE :

SHEET NO. : 5

ANTENNA		TABLE	READING		FACTOR	EMISSION	LIMIT	MARGIN	NOTE
POL.	HEIGHT	RADIAN	FREQUENCY	LEVEL		LEVEL			
HOR/VER	[m]	[Deg.]	[MHz]	[dB μ V]	[dB μ V/m]	[dB μ V/m]	[dB μ V/m]	[dB]	
HOR	4.0	130	60.16	50.1	-19.4	30.7	40.0	9.3	
VER	1.0	260	60.16	55.3	-19.4	35.9	40.0	4.1	
HOR	4.0	125	66.40	57.4	-20.9	36.5	40.0	3.5	*
VER	1.0	35	66.41	54.3	-20.9	33.4	40.0	6.6	
HOR	3.0	65	67.77	53.7	-21.1	32.6	40.0	7.4	
HOR	3.2	350	99.60	53.3	-17.9	35.4	43.5	8.1	
VER	1.0	230	99.60	52.1	-17.9	34.2	43.5	9.3	
VER	1.0	25	161.11	38.1	-11.6	26.5	43.5	17.0	
HOR	2.3	340	169.34	43.6	-11.1	32.5	43.5	11.0	
HOR	1.2	40	232.42	47.2	-9.2	38.0	46.0	8.0	
HOR	1.0	300	314.86	47.8	-10.1	37.7	46.0	8.3	
VER	1.0	10	661.69	39.6	-3.7	35.9	46.0	10.1	

* : The worst emission.

FACTOR :Antenna Factor + Cable Loss - Amp Gain

Ver.1.10 F2#005

***** RADIATION MEASUREMENTS *****

STANDARD : FCC Part15 SubpartB
 CLASS : B
 DISTANCE [m] : 3
 DATE OF TEST : 2000/10/5
 TEST SITE : 2
 TEMP. [] : 20.0
 HUMIDITY [%] : 50.0
 OPERATOR : Y.Shindo
 COMPANY NAME: Sanyo Electric Co., Ltd.
 EUT : CD-RW Drive
 MODEL NO. : CRD-BP4
 SERIAL NO. : 38900004
 TEST MODE : AUDIO CD READ
 NOTE :

SHEET NO. : 6

ANTENNA		TABLE	READING		FACTOR	EMISSION	LIMIT	MARGIN	NOTE
POL.	HEIGHT	RADIAN	FREQUENCY	LEVEL		LEVEL			
HOR/VER	[m]	[Deg.]	[MHz]	[dB μ V]	[dB μ V/m]	[dB μ V/m]	[dB μ V/m]	[dB]	
HOR	3.8	95	60.16	49.3	-19.4	29.9	40.0	10.1	
VER	1.0	260	60.16	45.2	-19.4	25.8	40.0	14.2	
HOR	3.5	250	66.40	55.2	-20.9	34.3	40.0	5.7	
VER	1.0	15	66.41	57.3	-20.9	36.4	40.0	3.6	*
HOR	3.3	260	67.77	52.1	-21.1	31.0	40.0	9.0	
HOR	1.5	145	99.60	50.5	-17.9	32.6	43.5	10.9	
VER	1.0	230	99.60	56.9	-17.9	39.0	43.5	4.5	
HOR	2.0	190	232.42	46.2	-9.2	37.0	46.0	9.0	
HOR	1.2	315	315.05	48.4	-10.1	38.3	46.0	7.7	
VER	1.0	180	464.81	42.9	-8.1	34.8	46.0	11.2	
VER	1.2	270	661.69	36.2	-3.7	32.5	46.0	13.5	

* : The worst emission.

FACTOR :Antenna Factor + Cable Loss - Amp Gain

Ver.1.10 F2#005