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

TEST REPORT

Report No.: Z01C-02181
Issue Date: June 7, 2002

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 the international or national standards.

Applicant	:	Sanyo Electric Co., Ltd. Optical Device 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	:	JBQCDR028
Trade Name	:	SANYO
Model Number	:	CRD-BP1800P
Serial Number	:	1800PL149
EUT Condition	:	Pre-production

Test procedure	:	ANSI C63.4-1992
Date of test	:	June 3, 4, 2002
Test place	:	Site 1
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: Nobuaki Marukawa
EMC engineer

Authorized by: Hiroaki Suzuki
Chief Engineer

NVLAP LAB CODE 200306-0

Table of contents

1. Equipment description

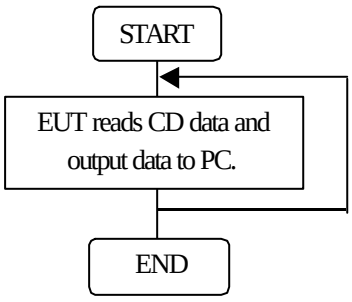
1.1 EUT information

No.	EUT	Company	Model No.	Serial No.	FCC ID/DoC	Comment
1	CD-RW Drive	SANYO	CRD-BP1800P	1800PL149	JBQCDR028	-

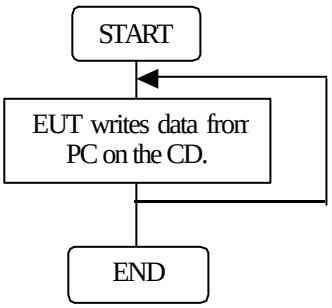
Max. used frequency	:	290.00MHz (±25%)
Oscillator(s)/Crystal(s) Operating frequency	:	33.86MHz, 290.00MHz (±25%)
Power ratings	:	DC +5V, +12V [EUT is powered from Host PC. Power supply for Host PC in testing was AC 120V 60Hz.]
Port(s)	:	Headphones jack Audio connector IDE connector DC connector (DC input)
Size	:	(W) 146 x (D) 188.5 x (H) 41.3 mm
Operating mode	:	CD Read mode CD Write mode
Variation of model(s)	:	Not applicable

1.2 Operating flow

<CD Read >



<CD Write >



2. Configuration information

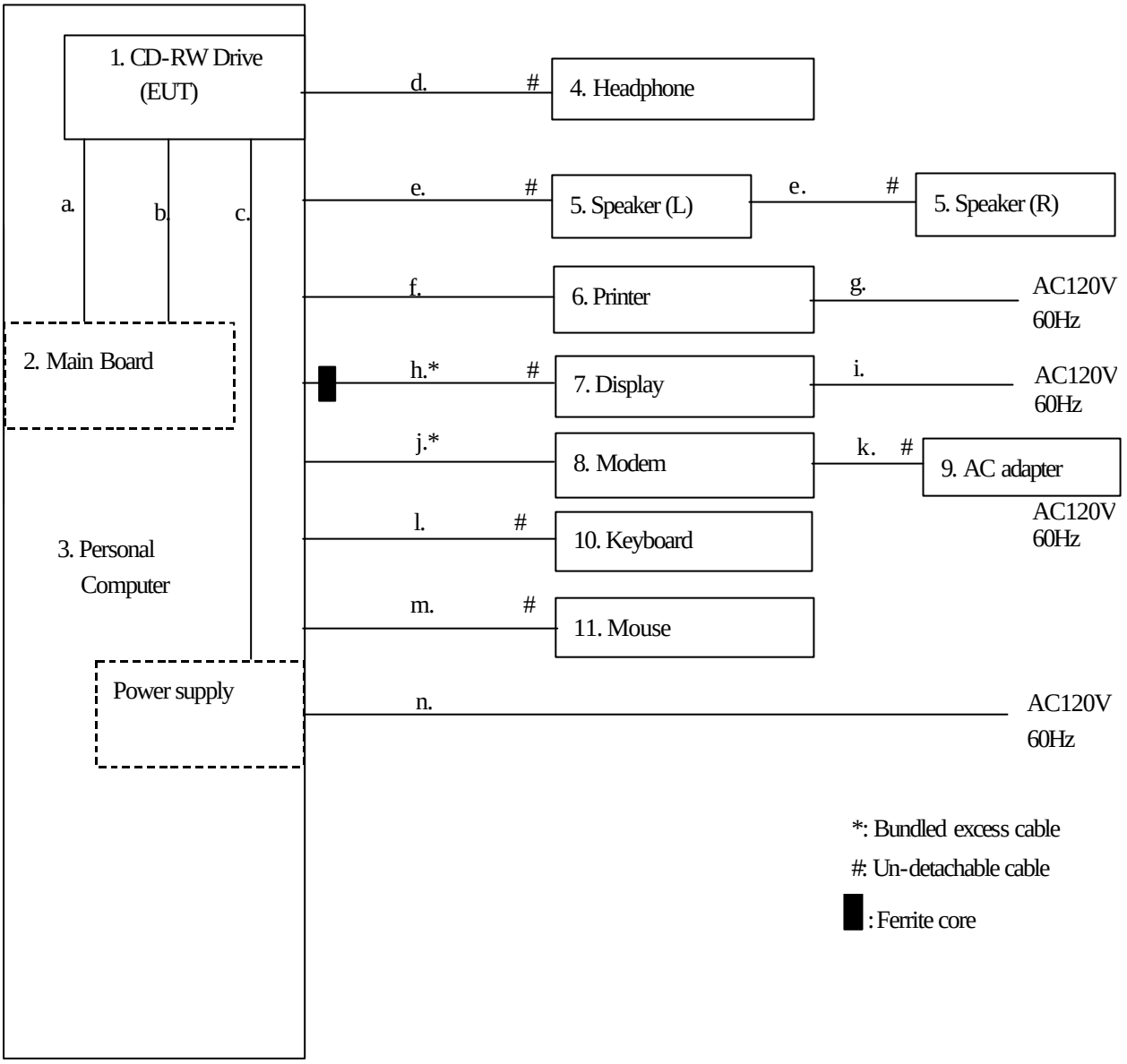
2.1 Peripheral(s) information

No.	Equipment	Company	Model No.	Serial No.	DoC / FCC ID	Comment
2	Main board	COMPAQ	N/A	N/A	N/A	-
3	Personal Computer	COMPAQ	Prosig 320 C500/ M1 JPN2	7016 CZHP0116	DoC	-
4	Headphone	FISHER	N/A	N/A	N/A	-
5	Speaker	Panasonic	RP-SP30	N/A	N/A	-
6	Printer	HP	C4555A	US6BC212N	B94C4555X	-
7	Display	Goldstar	Studio Works 56i	15005G004960	BEJCS585	-
8	Modem	US Robotics	839	000839032BK6YV4J	DoC	-
9	AC adapter for Modem	US Robotics	N/A	N/A	N/A	-
10	Keyboard	COMPAQ	KB-9965	B13B00WBUJ6150	DoC	-
11	Mouse	COMPAQ	Intelli Mouse	0805393-5	DoC	-

2.2 Cable(s) information

No.	Cable	Length [m]	Shield	Connector	From	To	Comment
a	IDE cable	0.4	Unshielded	Plastic	EUT	Main board	-
b	Audio cable	0.5	Unshielded	Plastic	EUT	Main board	-
c	DC cable	0.2	Unshielded	Plastic	EUT	Power supply	-
d	Headphone cable	1.0	Unshielded	Metal	EUT	Headphone	-
e	Speaker cable	1.0	Unshielded	Metal	PC	Speaker	-
f	Centronics cable	1.2	Shielded	Metal	PC	Printer	-
g	AC power cord for Printer	2.7	Unshielded	Plastic	Printer	AC outlet	-
h	RGB cable	1.5	Shielded	Metal	PC	Display	With one ferrite core Bundled excess cable.
i	AC power cord for Display	2.2	Unshielded	Plastic	Display	AC outlet	-
j	RS232C cable	1.4	Shielded	Metal	PC	Modem	Bundled excess cable.
k	DC cable for Modem AC adapter	2.0	Unshielded	Metal	Modem	AC adapter	-
l	Keyboard cable	2.0	Unshielded	Metal	PC	Keyboard	-
m	Mouse cable	1.8	Unshielded	Metal	PC	Mouse	-
n	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".

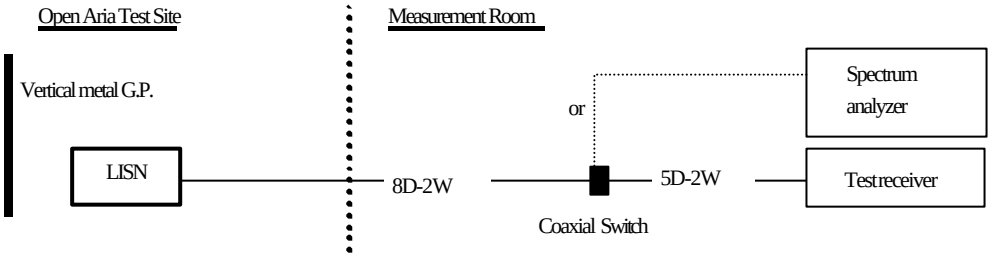
Note 2: RGB cable(No. h) with one ferrite core is un-detachable from Display. Ferrite core is not added during testing

3. Test procedure

3.1 Description of Conducted Emission testing

The conducted emission measurements are performed with the test receiver. The detector function of the test 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 at least six highest emissions 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 are on a 1 meter x 2.3 meter surface, 0.8 meter height wooden table. The vertical metal ground plane of 2.4 meter x 2.7 meter in size is placed 40 cm away from the rear of table top.
50Ω/50μH 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 50Ω.
Sufficient time for the EUT, support equipment and test equipment are allowed in order for them to warm up to their normal operating condition.

Test Configuration for Conducted emission Test



3.2 Test equipment for Conducted emission

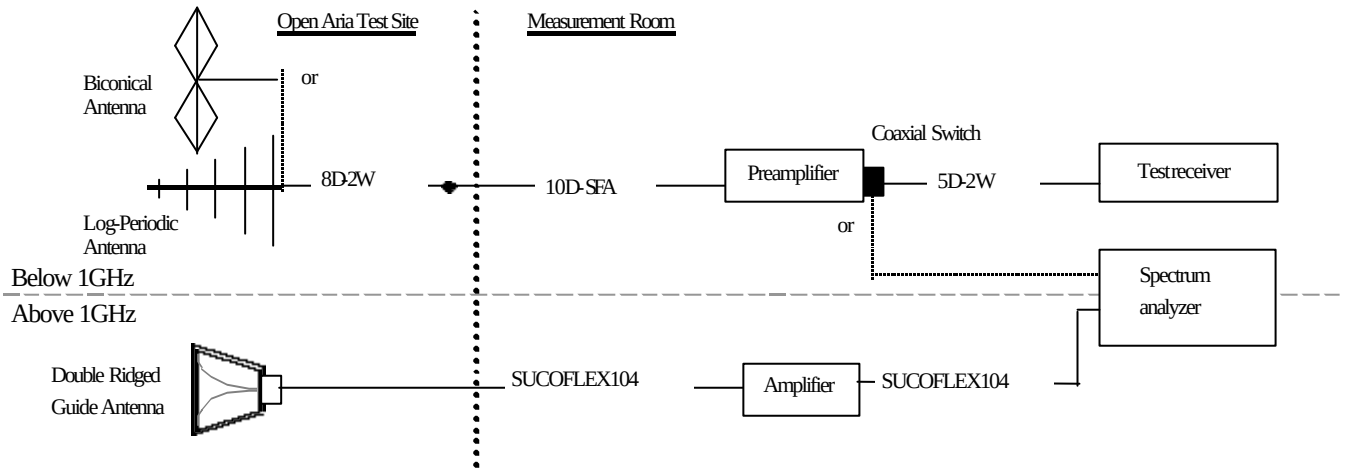
Equipment	Company	Model No.	Serial No.	Calibration date	Period
Spectrum analyzer	Agilent Technologies	8568B	2517A01302	Jul. 2001	1 year
Test Receiver	Kyoritsu Electrical Works, Ltd.	KNM-2402	4N-192-1	Nov. 2001	1 year
Line Impedance Stabilization Network for Host PC	Kyoritsu Electrical Works, Ltd.	KNW-407	8-693-19	Dec. 2002	1 year
Line Impedance Stabilization Network for Peripheral	Kyoritsu Electrical Works, Ltd.	KNW-242C	8-1096-3	Apr. 2002	1 year
50Ω terminator	Agilent Technologies	11593A	N/A	Aug. 2001	1 year
Coaxial cable	FUJIKURA	8D-2W/15m 5D-2W/1m	YTCRFC#1C	May. 2002	1 year
Coaxial Switch	ANRITSU	MP59B	6100097273	May. 2002	1 year

* The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.

3.3 Description of Radiated emission testing

Radiated emission measurements are performed at 3m distance with the broadband antenna (Biconical antenna, log-periodic antenna and double-ridged guide 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 with the test receiver, and above 1GHz, with the spectrum analyzer. The detector function of the test receiver is set to CISPR Quasi-peak mode and the bandwidth is set to 120kHz. Peak and average detectors are used for measurements above 1GHz. The bandwidth of the spectrum analyzer is set to 1MHz.
The EUT and support equipment are placed on a 1 meter x 2.3 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. The highest frequency used in the EUT is 290MHz, therefore, the frequency range is investigated from 30MHz up to the frequency 2GHz, as specified in CFR section 15.33, and at least six highest emissions 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.

Test Configuration for Radiated emission Test



3.4 Test equipment for Radiate demission

[Testing below 1GHz]

Equipment	Company	Model No.	Serial No.	Calibration date	Period
Spectrum analyzer	Agilent Technologies	8568B	2517A01302	Jul. 2001	1 year
Preamplifier	Anritsu	MH648A	M96057	Oct. 2001	1 year
Test Receiver	Kyoritsu Electrical Works, Ltd.	KNM-5002 KCV-6002	4N-187-10 4-257-1	Dec. 2001	1 year
Biconical Antenna	Schwarzbeck	VHA9103/BBA9106	1635	May. 2002	1 year
Log Periodic Antenna	Schwarzbeck	UHALP9108A	0436	Oct. 2001	1 year
Coaxial cable	FUJIKURA	8D-2W/8m 10D-SFA/29m 5D-2W/1m	YTCRFC#1R	May. 2002	1 year
Coaxial Switch	ANRITSU	MP59B	6100097273	May. 2002	1 year
Site attenuation	ZACTA Technology Corp.	Site 1	N/A	Nov. 2001	1 year

[Testing above 1GHz]

Equipment	Company	Model No.	Serial No.	Calibration date	Period
Spectrum Analyzer	ADVANTEST	R3271A	65050042	Jun. 2001	1 year
Preamplifier	Agilent Technologies	HP8449B	3008A00589	Jun. 2001	1 year
Double Ridged Guide Antenna	EMCO	3115	4327	Sep. 2001	1 year
Coaxial cable	SUHNER	SUCOFLEX 104/15m SUCOFLEX 104/1m	108014/4 108015/4	May. 2002	1 year

* The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.

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 (Terms of validity: 3 years)
Site 1, Site 2 and Site 3	March 6, 2000

2) Industry Canada Oats site filing: Pursuant to RSS 212, Issue 1(Provisional)

Site name	Sites on file: Oats 3m/10m	Filing date (Terms of validity: 3 years)
Site 1	4224-1	January 31, 2002
Site 2	4224-2	January 31, 2002
Site 3	4224-3	January 31, 2002

3) 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

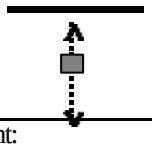
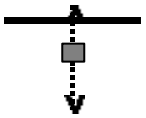
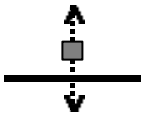
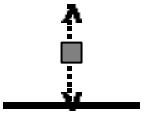
4) NVLAP Accreditation:
NVLAP Lab. code: 200306-0
NVLAP information: NVLAP accreditation does not constitute any product endorsement by NVLAP or any agent of the U.S. Government
Scope of accreditation
Emission test methods: CISPR22, FCC Part 15-Digital Devices (Conducted / Radiated emission), AS/NZS3548.
Immunity test methods: IEC61000-4-2, 4-3, 4-4, 4-5, 4-6, 4-8, 4-11

4.2 Uncertainty

Expanded Uncertainties stated were calculated with a coverage Factor k=2.

±2.97dB	··· For Conducted Emission
±5.23dB	··· For 3m Radiated Emission
±4.26dB	··· For 10m Radiated Emission

Judgment of Uncertainty under the measurement data and the scope of permission

Example A	Example B	Example C	Example D
Limit 	Limit 	Limit 	Limit 
Judgment: Complied	Judgment: Complied	Judgment: Not complied	Judgment: Not complied
The result of measurement is compliance with the limit in 95% or more confidence probability.	The result of measurement is compliance with the limit with less extent of uncertainty of the measurement. It is impossible to consider it complies with the limit in 95% confidence probability, but the result satisfies the limit in high probability.	The result of measurement is not compliance with the limit with less extent of uncertainty of the measurement. It is impossible to consider it complies with the limit in 95% confidence probability, but the result does not satisfy the limit in high probability.	The result of measurement is not compliance with the limit.

: Limit ■: Result of the measurements ---------- : Uncertainty

5. Results of the measurements

5.1 Results of the measurements

The minimum margins to the limits are as follows.

	Margin	Frequency	Detector	Phase	Operating mode	Data sheet
Conducted emission	9.5dB	0.876MHz	Quasi-peak	L2	CD Read mode	No. 1

	Margin	Frequency	Antenna Polarity	Antenna Height	Table degree	Operating mode	Data sheet
Radiated emission	4.2dB	1310.41MHz	Vertical	1.0m	5°	CD Write mode	No. 4

5.2 Deviation from the standard

Not applicable.

5.3 Sample of field strength calculation

Conducted Emission [Sample Calculation] $dBuV = 20\log_{10}(uV)$

Class B
Limit @3.332MHz = 250uV = 48.0dBuV
Reading = 41.6dBuV Cable Loss + LISN Factor = 0.2 + 0.5 = 0.7dB Total = 41.6 + 0.7 = 42.3dBuV Margin = 48.0 - 42.3 = 5.7dB

Radiated Emission [Sample Calculation] $dBuV/m = 20\log_{10}(uV/m)$

Class B
Limit @147.6MHz = 150uV/m = 43.5dBuV/m
Reading = 42.8dBuV Ant. Factor + Cable Loss - Amp. Gain = 14.2 + 3.0 - 30.0 = -12.8dB Total = 42.8 - 12.8 = 30.0dBuV/m Margin = 43.5 - 30.0 = 13.5dB

6. Test Data

***** CONDUCTED EMISSION *****

Standard : FCC Part15 SubpartB
Class : B

Sheet Number : 1

Date of test : 2002/6/4
Test Site : 1
Temperature [℃] : 27.4
Humidity [%] : 31.3
Operator : N.Marukawa
Company Name : SANYO Electric Co., Ltd
EUT : CD-RW Drive
Model Number : CRD-BP1800P
Serial Number : 1800PL149
Test Mode : CD Read
Comment :

Signature : N. Marukawa

Phase	Frequency	Reading QP	Reading AV	Factor	Emission Level QP	Emission Level AV	Limit QP	Limit AV	Margin QP	Margin AV	Comment
	[MHz]	[dBμV]	[dBμV]	[dB]	[dBμV]	[dBμV]	[dBμV]	[dBμV]	[dB]	[dB]	
L1	0.486	33.7		0.3	34.0		48.0		14.0		
L1	0.675	35.4		0.3	35.7		48.0		12.3		
L1	0.742	32.8		0.3	33.1		48.0		14.9		
L1	0.875	37.5		0.3	37.8		48.0		10.2		
L1	0.943	36.0		0.3	36.3		48.0		11.7		
L1	1.214	35.9		0.3	36.2		48.0		11.8		
L2	0.486	35.2		0.3	35.5		48.0		12.5		
L2	0.673	37.0		0.3	37.3		48.0		10.7		
L2	0.742	35.2		0.3	35.5		48.0		12.5		
L2	0.876	38.2		0.3	38.5		48.0		9.5		*
L2	0.944	36.5		0.3	36.8		48.0		11.2		
L2	1.214	36.3		0.3	36.6		48.0		11.4		

* : The worst emission. Factor : LISN Factor + Cable Loss Ver.2.20 F1#005

***** CONDUCTED EMISSION *****

Standard : FCC Part15 SubpartB
Class : B

Sheet Number : 2

Date of test : 2002/6/4
Test Site : I
Temperature [℃] : 27.4
Humidity [%] : 31.3
Operator : N.Marukawa
Company Name : SANYO Electric Co., Ltd
EUT : CD-RW Drive
Model Number : CRD-BP1800P
Serial Number : 1800PL149
Test Mode : CD Write
Comment :

Signature : N. marukawa

Phase	Frequency	Reading QP	Reading AV	Factor	Emission Level QP	Emission Level AV	Limit QP	Limit AV	Margin QP	Margin AV		Comment
	[MHz]	[dBμV]	[dBμV]	[dB]	[dBμV]	[dBμV]	[dBμV]	[dBμV]	[dB]	[dB]		
L1	0.472	35.0		0.3	35.3		48.0		12.7			
L1	0.587	36.9		0.3	37.2		48.0		10.8		*	
L1	0.675	35.4		0.3	35.7		48.0		12.3			
L1	0.879	35.9		0.3	36.2		48.0		11.8			
L1	0.945	35.7		0.3	36.0		48.0		12.0			
L1	1.282	36.3		0.3	36.6		48.0		11.4			
L2	0.472	35.4		0.3	35.7		48.0		12.3			
L2	0.584	34.0		0.3	34.3		48.0		13.7			
L2	0.675	36.7		0.3	37.0		48.0		11.0			
L2	0.877	36.9		0.3	37.2		48.0		10.8		*	
L2	0.945	35.8		0.3	36.1		48.0		11.9			
L2	1.281	35.2		0.3	35.5		48.0		12.5			

* : The worst emission. Factor : LISN Factor + Cable Loss Ver.2.20 F18005

***** RADIATED EMISSION *****

Standard : FCC Part15 SubpartB
Class : B
Distance [m] : 3
Date of test : 2002/6/3
Test Site : 1
Temperature [℃] : 24.6
Humidity [%] : 39.3
Operator : N.Marukawa
Company Name : SANYO Electric Co., Ltd.
EUT : CD-RW Drive
Model Number : CRD-BP1800P
Serial Number : 1800PL149
Test Mode : CD Read
Comment :

Sheet Number : 3

Signature : N. Marukawa

Antenna Pol.	Height	Table Radian	Reading Frequency	Level	Factor	Emission Level	Limit	Margin		Comment
HOR/VER	[m]	[Deg.]	[MHz]	[dBμV]	[dB/m]	[dBμV/m]	[dBμV/m]	[dB]		
VER	1.0	345	108.97	49.2	-17.8	31.4	43.5	12.1		
HOR	2.4	350	199.97	37.1	-11.1	26.0	43.5	17.5		
HOR	1.2	300	262.77	31.6	-10.1	21.5	46.0	24.5		
HOR	1.0	300	465.85	45.0	-9.7	35.3	46.0	10.7		
HOR	2.4	0	526.23	34.0	-8.6	25.4	46.0	20.6		
VER	1.1	340	526.23	35.3	-8.6	26.7	46.0	19.3		
HOR	2.4	310	788.50	39.7	-4.6	35.1	46.0	10.9		
VER	1.0	165	788.73	40.6	-4.6	36.0	46.0	10.0		
VER	1.0	15	1054.33	52.1	-7.5	44.6	54.0	9.4		PK
VER	1.0	15	1054.33	30.1	-7.5	22.6	54.0	31.4		AV
VER	1.0	330	1129.76	52.1	-7.1	45.0	54.0	9.0		PK
VER	1.0	330	1129.76	30.4	-7.1	23.3	54.0	30.7		AV
HOR	1.0	245	1130.00	53.2	-7.1	46.1	54.0	7.9		PK
HOR	1.0	245	1130.00	32.7	-7.1	25.6	54.0	28.4		AV
VER	1.0	355	1315.77	54.1	-6.4	47.7	54.0	6.3	*	PK
VER	1.0	355	1315.77	30.8	-6.4	24.4	54.0	29.6		AV
HOR	1.0	10	1316.94	50.6	-6.4	44.2	54.0	9.8		PK
HOR	1.0	10	1316.94	28.2	-6.4	21.8	54.0	32.2		AV

*: The worst emission. Factor: Antenna Factor + Cable Loss - Amp Gain Ver.2.20 FI#005

***** RADIATED EMISSION *****

Standard : FCC Part15 SubpartB
Class : B
Distance [m] : 3
Date of test : 2002/6/3
Test Site : 1
Temperature [℃] : 25.5
Humidity [%] : 33.1
Operator : N.Marukawa
Company Name : SANYO Electric Co., Ltd.
EUT : CD-RW Drive
Model Number : CRD-BP1800P
Serial Number : 1800PL149
Test Mode : CD Write
Comment :

Sheet Number : 4

Signature : N. Marukawa

Antenna Pol. HOR/VER	Height [m]	Table Radian [Deg.]	Reading Frequency [MHz]	Reading Level [dBμV]	Factor [dB/m]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]		Comment
VER	1.0	35	109.30	48.0	-17.8	30.2	43.5	13.3		
HOR	2.6	350	135.01	43.0	-14.1	28.9	43.5	14.6		
HOR	1.9	320	185.67	38.6	-11.4	27.2	43.5	16.3		
HOR	1.0	300	399.29	41.1	-10.9	30.2	46.0	15.8		
HOR	1.0	300	465.85	44.3	-9.7	34.6	46.0	11.4		
VER	1.8	155	466.00	44.8	-9.7	35.1	46.0	10.9		
VER	1.5	0	793.02	42.7	-4.5	38.2	46.0	7.8		
VER	1.0	345	1131.17	53.5	-7.1	46.4	54.0	7.6		PK
VER	1.0	345	1131.17	29.6	-7.1	22.5	54.0	31.5		AV
HOR	1.0	245	1131.46	53.3	-7.1	46.2	54.0	7.8		PK
HOR	1.0	245	1131.46	30.5	-7.1	23.4	54.0	30.6		AV
VER	1.0	5	1310.41	56.2	-6.4	49.8	54.0	4.2	*	PK
VER	1.0	5	1310.41	31.0	-6.4	24.6	54.0	29.4		AV

* : The worst emission. Factor: Antenna Factor + Cable Loss - Amp Gain Ver.2.20 F1#005