



DVD-RW Drive (for SL & DL)

TEST SPECIFICATION

Version 1.7₁
January 2008

Amendment for DVD-RW Drive (for SL & DL) TS Version 1.7₁ (January 2008)

The following pages were amended without changing the version number of the TS.

- **Minor amendment (May 20, 2009)**

Page	Location	Amendment
Page 24	Annex A	<ul style="list-style-type: none">• Class-A Lab information of "Victor Company of Japan, Limited", "Industrial Technology Research Institute" and "Sony Corporation" was updated.
Page 27	Annex D	<ul style="list-style-type: none">• Class-A Lab information of "Victor Company of Japan, Limited" was updated.

- **Minor amendment (January 2010)**

Page	Location	Amendment
Page 24	Annex A	<ul style="list-style-type: none">• Class-A Lab information of "PIONEER CORPORATION", "Victor Company of Japan, Limited" and "Hitachi, Ltd. (company name)" were updated.
Page 27	Annex D	<ul style="list-style-type: none">• Class-A Lab information of "PIONEER CORPORATION" and "Victor Company of Japan, Limited" were updated.

- **Amendment 1 (January 2012)**

Page	Location	Amendment
Page 24	Annex A	<ul style="list-style-type: none">• "Toshiba Corporation" was deleted from the Class-A Lab list.• The company name "Victor Company of Japan, Limited" was changed to "JVC KENWOOD Corporation".
Page 27	Annex D	<ul style="list-style-type: none">• The company name "Victor Company of Japan, Limited" was changed to "JVC KENWOOD Corporation".

- **Amendment 2 (June 2012)**

Page	Location	Amendment
Page 24	Annex A	<ul style="list-style-type: none">• "Industrial Technology Research Institute" was deleted from the Class-A Lab list.• Class-A Lab information of "Sony Corporation" was updated.

Conditions for Publication

Copyright

It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of DVD Format Verification. You may not copy the file or printed version of the document, or any part of it, for any other purpose without prior written permission from **DVD Format/Logo Licensing Corporation**.

Exemption

None will be liable for any damages from use of this document.

Publisher and Copyright Holder

DVD Format/Logo Licensing Corporation

Contributors

- Hitachi Consumer Electronics Co., Ltd. (Tokyo, Japan)
- Industrial Technology Research Institute (Hsinchu, Taiwan)
- JVC KENWOOD Corporation (Yokohama, Japan)
- Panasonic Corporation (Osaka, Japan)
- PIONEER CORPORATION (Tokyo, Japan)
- Sony Corporation (Tokyo, Japan)
- Toshiba Corporation (Tokyo, Japan)

Inquiry

For any further explanation of the contents of this document or in case of any perceived inconsistency or ambiguity of interpretation, please consult:

DVD Format/Logo Licensing Corporation

Address: 2F Shibadaimon Makita Bldg., 2-5-8 Shibadaimon, Minato-ku, Tokyo, 105-0012 Japan

Fax: +81-3-5777-2884

E-mail: info@dvdflc.co.jp URL: <http://www.dvdflc.co.jp>

Revision History

- November 1999
DVD-RW Drive Test Specification version 1.0 (draft) was agreed by Verification Task Force members.
- September 2000
DVD-RW Drive Test Specification version 1.1(Draft) was distributed to SG-9 members.
- October 2000
DVD-RW Drive Test Specification Version 1.1 (Draft) was approved by VTF.
- August 22, 2002
Version-up 1.2 to add the test procedure and items for 2x-speed DVD-RW Drive was approved by VPC.
- May 15, 2003
Version-up to 1.3, to add the test procedures and items for 8cm/1x-speed DVD-RW Drive and 8cm/2x-speed DVD-RW Drive, was approved by VTF.
- December 17, 2004
Version-up to 1.4, to add the test procedure and items for 12cm/4x-speed DVD-RW Drive, was approved by VPC.
- June 5, 2004
Version-up to 1.5, to add the parameter of Class for determining a First Production Model, was approved by VPC.
- November 22, 2004
Version-up to 1.6, to add the test procedure and items for 12cm/6x/2x/1x-speed DVD-RW Drive, was approved by VTF.
- June 2005
Version 1.61 was edited as electronic files.
- December 5, 2007
DVD-RW Drive (for SL & DL) Test Specifications Version 1.7 was approved by TSTF.
The Version 1.7 added Test Specification for 12cm/2x-speed DVD-RW Drive for DL based on DVD-RW for DL Book Part 1: Ver.2.0.
- December 17, 2007
Version 1.71, to update the test specification regarding Modulated amplitude for DL, was approved by SG9.
(The Version 1.71 was issued in January 2008.)

Table of Contents

1. General	1
1.1 Scope	1
1.2 Normative References	1
1.3 Scope of Products Covered	1
2. DVD Logo	3
2.1 Definition of Terms Used	3
2.2 DVD Logo Mechanism	5
3. General procedure of Test	7
3.1 Test procedure for SL Drive	7
3.2 Test procedure for DL Drive	9
4. Test Tools and Test Specifications for 12cm/1x-speed SL Drive	10
4.1 Test Tools	10
4.1.1 Test Discs and Verifier	10
4.1.2 DVD-RW measuring system (Playback)	10
4.2 Test Specifications	10
4.2.1 Recording characteristics	10
4.2.2 1x-speed Linking characteristic	11
4.2.3 Information data in Lead-in and RMA	11
4.2.4 Reading characteristics	11
4.2.5 Compliance check of Defectiveness	11
5. Test Tools and Test Specifications for 8cm/1x-speed SL Drive	12
5.1 Test Tools	12
5.1.1 Test Discs	12
5.1.2 DVD-RW measuring system (Playback)	12
5.2 Test Specifications	12
5.2.1 Recording characteristics	12
5.2.2 1x-speed Linking characteristic	13
5.2.3 Information data in Lead-in and RMA	13
5.2.4 Reading characteristics	13
6. Test Specifications for 12cm/2x-speed recording capability of SL Drive	14
6.1 Test Tools	14
6.1.1 Test Disc	14
6.1.2 DVD-RW measuring system (Playback)	14
6.2 Test Specifications	14
6.2.1 Recording characteristics	14

6.2.2 2x-speed Linking characteristic	15
6.2.3 Information data in Lead-in and RMA	15
7. Test Specifications for 8cm/2x-speed recording capability of SL Drive	16
7.1 Test Tools	16
7.1.1 Test Disc	16
7.1.2 DVD-RW measuring system (Playback)	16
7.2 Test Specifications	16
7.2.1 Recording characteristics	16
7.2.2 2x-speed Linking characteristic	17
7.2.3 Information data in Lead-in and RMA	17
8. Test Specifications for 12cm/4x-speed recording capability of SL Drive	18
8.1 Test Tools	18
8.1.1 Test Disc	18
8.1.2 DVD-RW measuring system (Playback)	18
8.2 Test Specifications	18
8.2.1 Recording characteristics	18
8.2.2 4x-speed Linking characteristic	19
8.2.3 Information data in Lead-in and RMA	19
9. Test Specifications for 12cm/6x-speed recording capability of SL Drive	20
9.1 Test Tools	20
9.1.1 Test Disc	20
9.1.2 DVD-RW measuring system (Playback)	20
9.2 Test Specifications	20
9.2.1 Recording characteristics	20
9.2.2 6x-speed Linking characteristic	21
9.2.3 Information data in Lead-in and RMA	21
10. Test Tools and Test Specifications for 12cm/2x-speed DL Drive	22
10.1 Test Tools	22
10.1.1 Test Discs	22
10.1.2 DVD-RW measuring system for DL (Playback)	22
10.2 Test Specifications	22
10.2.1 Recording characteristics	22
10.2.2 2x-speed Linking characteristic	23
10.2.3 Information data in Lead-in and RMA	23
10.2.4 Reading characteristics	23

Annex A

List of Class-A Verification Labs	24
---	----

Annex B

Glossary of Terms used	25
------------------------------	----

Annex C

Procedure for Class-A Verification Lab Product Submission	26
---	----

Annex D

Test Tool Contact Information	27
-------------------------------------	----

Forms for DVD Format verification

Form 1L

Preliminary Information for DVD Format Verification F1

Form 2L

Test Information of DVD Format Verification F2

Form 3L

Test results of Recording characteristics for 12cm/1x-speed SL F4

Form 4L

Test result of 1x-speed Linking characteristic for 12cm SL F6

Form 5L

Test results of Information data in Lead-in and RMA for 12cm/1x-speed SL F7

Form 6L

Test result of Reading characteristics for 12cm SL F9

Form 7L

Test result of Enhanced Defect Reporting (EDR) for SL F10

Form 8L

Test results of Recording characteristics for 8cm/1x-speed SL F11

Form 9L

Test result of 1x-speed Linking characteristic for 8cm SL F13

Form 10L

Test results of Information data in Lead-in and RMA for 8cm/1x-speed SL F14

Form 11L

Test result of Reading characteristics for 8cm SL F16

Form 12L

Test results of Recording characteristics for 12cm/2x-speed SL F17

Form 13L

Test result of 2x-speed Linking characteristic for 12cm SL F19

Form 14L

Test results of Information data in Lead-in and RMA for 12cm/2x-speed SL F20

Form 15L

Test results of Recording characteristics for 8cm/2x-speed SL F22

Form 16L

Test result of 2x-speed Linking characteristic for 8cm SL F24

Form 17L

Test results of Information data in Lead-in and RMA for 8cm/2x-speed SL F25

Form 18L

Test results of Recording characteristics for 12cm/4x-speed SL F27

Form 19L

Test result of 4x-speed Linking characteristic for 12cm SL F29

Form 20L

Test results of Information data in Lead-in and RMA for 12cm/4x-speed SL F30

Form 21L

Test results of Recording characteristics for 12cm/6x-speed SL F32

Form 22L

Test result of 6x-speed Linking characteristic for 12cm SL F34

Form 23L

Test results of Information data in Lead-in and RMA for 12cm/6x-speed SL F35

Form 24L

Test results of Recording characteristics for 12cm/2x-speed DL F37

Form 25L

Test result of 2x-speed Linking characteristic for 12cm DL F41

Form 26L

Test results of Information data in Lead-in and RMA for 12cm/2x-speed DL F42

Form 27L

Test result of Reading characteristics for 12cm DL F46

Form 28L

Confirmation of DVD Format Verification F47

1. General

1.1 Scope

The scope of this Test Specification is the testing "DVD-RW Drive (for SL & DL)" for compliance with DVD Specifications mentioned in **1.2**. Test Specifications for 6 types of DVD-RW Drive (for SL) and 1 type of DVD-RW Drive for DL described in **1.3** are specified in this document. Hereinafter, DVD-RW Drive recordable DVD-RW Disc (for SL) may be called **DVD-RW Drive or SL Drive** and DVD-RW Drive recordable DVD-RW Disc for DL may be called **DVD-RW Drive for DL or DL Drive**.

The test procedure described herein could be used by Class-A Verification Labs, Class-B Verification Labs and Quality Assurance Departments of "DVD-RW Drive (for SL & DL)" manufacturers.

The scope of this Test Specification is limited to product's compliance to DVD Specifications and not to evaluate performance of products.

1.2 Normative References

a) DVD Specifications for Re-recordable Disc (DVD-RW)

Part 1: Physical Specifications Version 1.2

Optional Specifications 2x-speed DVD-RW Revision 1.0

Optional Specifications 4x-speed DVD-RW Revision 2.0

Optional Specifications 6x-speed DVD-RW Revision 3.0

Part 2: File System Specifications Version 1.0

b) DVD Specifications for Re-recordable Disc for Dual Layer (DVD-RW for DL)

Part 1: Physical Specifications Version 2.0

1.3 Scope of Products Covered

a) DVD-RW Drive (SL Drive)

12cm type	1x-speed DVD-RW Drive (Class 0)	(Note*1)
	2x/1x-speed DVD-RW Drive (Class 0&1)	(Note*2)
	4x/2x/1x-speed DVD-RW Drive (Class 0&1)	(Note*2)
	6x/2x/1x-speed DVD-RW Drive (Class 0&1)	(Note*2) (Note*4)
8cm type	1x-speed DVD-RW Drive (Class 0)	(Note*1)
	2x/1x-speed DVD-RW Drive (Ver. 1.1)	(Note*3)

b) DVD-RW Drive for DL (DL Drive)

12cm type	2x-speed DVD-RW Drive for DL (Class 0)	(Note*5)
-----------	--	----------

Notes:

*1: DVD-RW Drive (Class 0) means that the Drive is adaptable to the DVD-RW discs having Class 0.

*2: DVD-RW Drive (Class 0&1) means that the Drive is adaptable to the DVD-RW discs having Class 0 and/or Class 1.

- *3: DVD-RW Drive (Ver. 1.1) means that the Drive complies with the previous version 1.1 of DVD-RW Book Part 1. In this version of Test Specification, the 8cm/2x/1x-speed DVD-RW Drive (Class 0&1) is verified as Version 1.1 product (Class 0 Drive), due to the Test Discs which are available only for Ver. 1.1.
- *4: The recording speeds (Nx) specify the Maximum recording speed and the Basic recording speed(s) that the Drive supports. The Drive can also support other recording speed between the Maximum and Basic speed.
- *5: DVD-RW Drive for DL (Class 0) means that the Drive is adaptable to the DVD-RW for DL discs having Class 0.

2. DVD Logo

DVD Format/Logo Licensing Corporation owns the rights to license the DVD Logo. To be able to use the DVD Logo, DVD manufacturer must have:

- a. License to use the Logo and
- b. DVD Specification compliance of the product for logo consideration must be validated by the test specifications as defined in this document.

Licensing terms for the DVD Logo are available from the DVD Format/Logo Licensing Corporation.

This chapter describes the mechanism to be used for product compliance testing.

2.1 Definition of Terms Used

First Production Model - The **First Production Model** must be tested and approved by any of the appropriate Class-A Verification Labs (see definition of Class-A Labs below) for compliance with DVD Specifications.

Class-A Labs will use the test specifications described in this document for compliance verification.

The following parameters must be used to determine a **First Production Model** for each of "DVD-RW Drive" (SL Drive) and "DVD-RW Drive for DL" (DL Drive) independently.

- DVD Specifications Version n.x changing to $n \pm 1.x$
- Initial or the latest production model at the start of Logo Program for each licensee
- Production model that supports additional Class

Examples of First Production Model:

- SL Drive:
 - Class 0 Drive: 1x-speed DVD-RW Drive
 - Class 0&1 Drive: 2x/1x-speed DVD-RW Drive, 4x/2x/1x-speed DVD-RW Drive
- DL Drive:
 - Class 0 Drive: 2x-speed DVD-RW Drive

Next Production Model - A **Next Production Model** does not require compliance verification from a Class-A Verification Lab but must be tested by licensee in its QA department for compliance with DVD Specifications. Licensee's QA department must have the test tools required to perform the tests specified in this document and must, at minimum, use the test procedure referred to in this document (licensee is free to have its own QA procedure, equipment and tools as long as it is a superset of the specification described in this document). A Licensee without own QA department can get the product tested by a certified Third Party Class-B Verification Lab (see definition of Class-B Labs below).

The following parameters must be used to determine a **Next Production Model**:

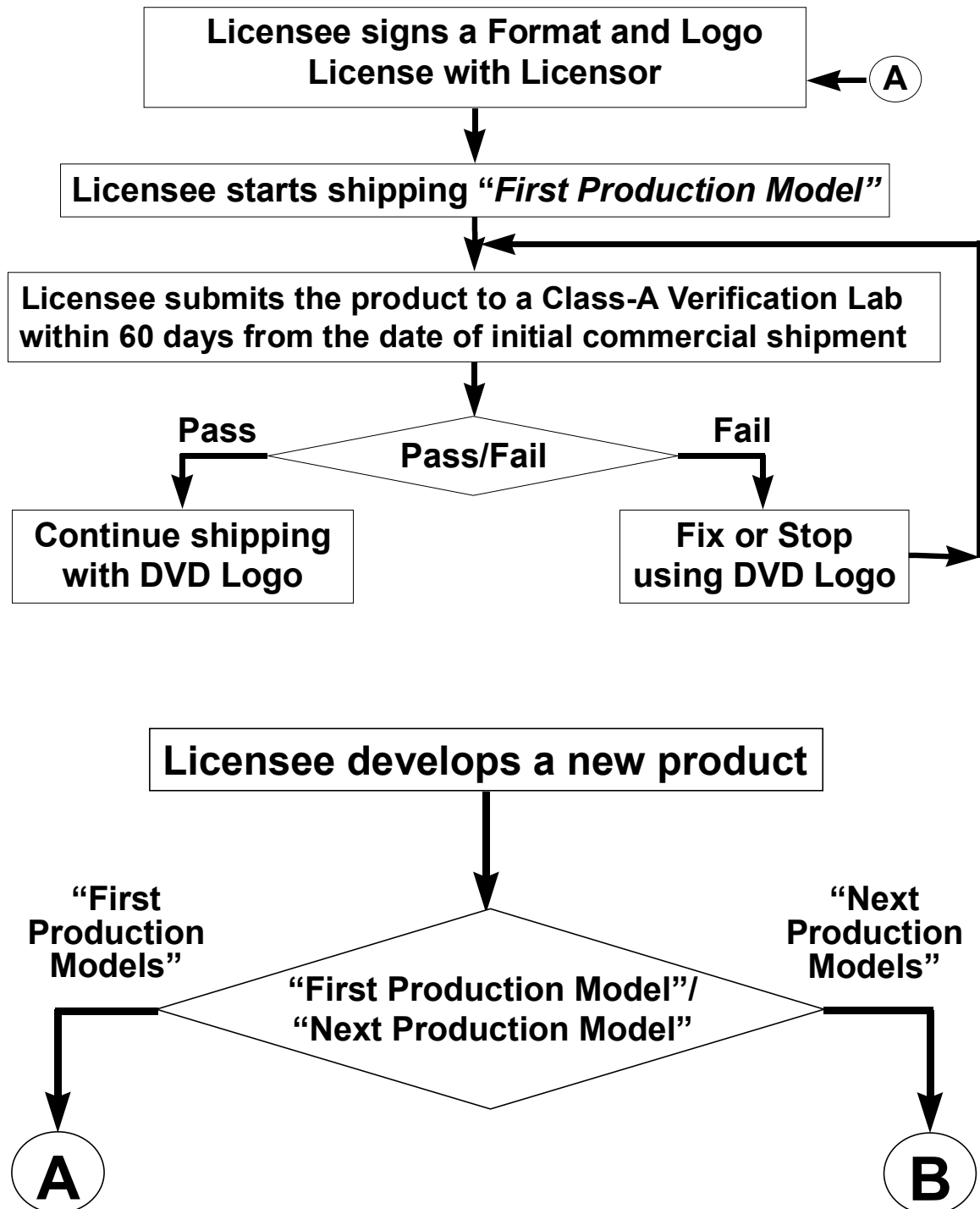
- DVD Specifications Version n.x changing to $n.x+1$
- Change to add or reduce supporting disc size (8cm or 12cm)
- Change to add or reduce applicable recording speed(s) without adding Class (i.e. Basic recording speed)
- Significant changes at Licensees discretion to Pickup head, LSI and/or firmware related to DVD format

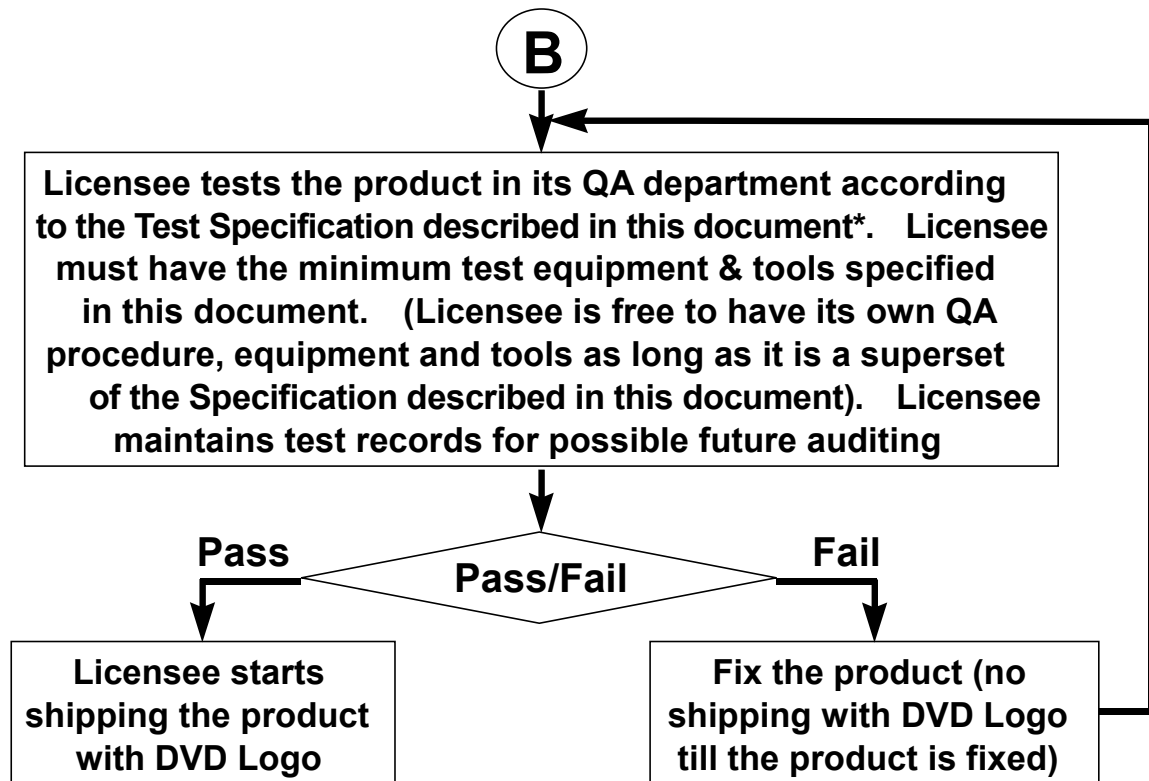
Class-A Verification Labs - Class-A Verification Labs are experts in DVD technology and provide independent expert assessment of Licensee's product compliance with respect to DVD Specifications. Class-A Labs also provide additional services such as interpretation of DVD Specifications, Test Tool development, Class-B Labs and Licensees auditing, etc.

Class-B Verification Labs - DVD-RW Drive Class-B Verification Labs provide DVD-RW Drive testing strictly according to **DVD-RW Drive (for SL & DL) Test Specification** (They can not interpret specifications).

2.2 DVD Logo Mechanism

The DVD Logo mechanism is described in the following flow chart:





*: Licensee without own QA department can get the product tested by a **DVD-RW Drive Class-B Verification Lab**.

3. General procedure of Test

The following sections describe the requirements and test specifications for DVD-RW Drive products described in **1.3 Scope of Products Covered**.

The discs recorded with DVD-RW Drive have to be in compliance with the physical DVD requirements as indicated in DVD Specifications mentioned in **1.2**.

This shall be confirmed by parameters as mentioned in **Form 3L to Form 27L**. Final judgment shall be made by **Form 28L**.

3.1 Test procedure for SL Drive

- Test shall be carried out according to the nomination of "Class" and "Maximum recording speed" applied in **Form 2L** (1/2).

Test procedure of each recording speed is described in the following chapters from **4** to **9** respectively.

Table 3.1-1 and **Table 3.1-2** show the relation between "Product type" and "Chapter number" to be carried out.

When "Required" is marked in the column of a chapter, the test described in the chapter shall be carried out.

For example, in case of Model B1, Test described in chapter **4** and **6** shall be carried out.

Table 3.1-1 : "Product type" and "Chapter number" to be carried out (12cm SL Drive)

Product type					Chapter			
1st Production Model		Recording speed			4.	6.	8.	9.
		Class 0 Basic speed	Class 1 Basic speed	Max. speed	1x recording	2x recording	4x recording	6x recording
A	Class 0 1x-speed SL Drive	1x	----	1x	Required	----	----	----
B1	Class 0&1 2x/1x-speed SL Drive	1x	2x	2x	Required	Required	----	----
B2	Class 0&1 4x/2x/1x-speed SL Drive	1x	2x	4x	Required	Required	Required	----
B3	Class 0&1 6x/2x/1x-speed SL Drive	1x	2x	6x	Required	Required	----	Required

Table 3.1-2 : "Product type" and "Chapter number" to be carried out (8cm SL Drive)

Product type					Chapter	
1st Production Model		Recording speed			5.	7.
		Class 0 Basic speed	Class 1 Basic speed	Max. speed	1x recording	2x recording
A1	Class 0 1x-speed SL Drive	1x	----	1x	Required	----
A2	Ver. 1.1 2x/1x-speed SL Drive	1x	----	2x	Required	Required

- An applicant is requested to submit the test samples with the test results, which may be obtained by self-verification or verification conducted by Class-B Lab.
- For the confirmation of required test items, "Check list of Forms for Submission" is prepared in **Form 2L** (2/2). Write the check mark in each column according to your situation.

In the case of 12cm Drive, relation between "Product type" and "Check speed" at each measuring point in radius (R) are decided as shown in **Table 3.1-3**.

Table 3.1-3 : Relation between "Product type" and "Check speed" to be carried out (12cm SL Drive)

Product type		Measuring points in radius	Test Disc to be used			
			1x-speed RWBTD-011	4x/2x-speed RWBTD-031		6x/2x-speed RWBTD-041
A	Class 0 1x-speed SL Drive	25 mm	1x	-----	-----	-----
		40 mm	1x	-----	-----	-----
		55 mm	1x	-----	-----	-----
B1	Class 0&1 2x/1x-speed SL Drive	25 mm	1x	2x	-----	-----
		40 mm	1x	2x	-----	-----
		55 mm	1x	2x	-----	-----
B2	Class 0&1 4x/2x/1x-speed SL Drive	25 mm	1x	2x	*	-----
		40 mm	1x	2x	*	-----
		55 mm	1x	2x	4x	-----
B3	Class 0&1 6x/2x/1x-speed SL Drive	25 mm	1x	2x	-----	*
		40 mm	1x	2x	-----	*
		55 mm	1x	2x	-----	6x

1x, 2x, 4x, 6x : Recording by designated speed

* : Recording by nominated speed (to be specified in **Form 2L 1/2**)

----- : No check

3.2 Test procedure for DL Drive

- Test shall be carried out according to the nomination of "Maximum recording speed" applied in **Form 2L** (1/2). Test procedure of each recording speed is described in the following chapters from **10** respectively.

Table 3.2-1 shows the relation between "Product Type" and "Chapter number" to be carried out. When "Required" is marked in the column of a chapter, the test described in the chapter shall be carried out.

Table 3.2-1 : "Product type" and "Chapter number" to be carried out (12cm DL Drive)

Product type		Chapter
1st Production Model		10.
		2x recording
C	2x-speed DL Drive	Required

- An applicant is requested to submit the test samples with the test results, which may be obtained by self-verification or verification conducted by Class-B Lab.
- For the confirmation of required test items, "Check list of Forms for Submission" is prepared in **Form 2L** (2/2). Write the check mark in each column according to your situation.
- Relation between "Product type" and "Check speed" at each measuring point in radius (R) are decided as shown in **Table 3.2-2**.

Table 3.2-2 : "Product type" and "Check speed" to be carried out (12cm DL Drive)

Product type		Measuring points in radius	Test Disc to be used	
			2x-speed VRW-805-DL	
			L0	L1
C	2x-speed DL Drive	25 mm	2x	2x
		40 mm	2x	2x
		55 mm	2x	2x

2x : Recording by designated recording speed

4. Test Tools and Test Specifications for 12cm/1x-speed SL Drive

This chapter covers the test specifications and tool requirements for the physical and logical compliance testing the 12cm/1x-speed SL Drive and the 1x-speed recording capability of 12cm/2x/1x-speed SL Drive, 12cm/4x/2x/1x-speed SL Drive or 12cm/6x/2x/1x-speed SL Drive.

4.1 Test Tools

The following tools are required to perform the tests specified and shall be available before start executing the test procedures.

4.1.1 Test Discs and Verifier

The following test discs and verifier are used for testing 12cm SL Drive. As for acquisition, refer to **Annex D**.

- 12cm/1x-speed DVD-RW Standard Blank Test Disc : RWBTD-011(based on RW Book ver.1.1) (Pioneer)
- 12cm DVD-RW Standard Signal Test Disc : RWSTD-011 or RWSTD-101 (Pioneer)
- Enhanced Defect Reporting Test Disc : EDRTD-001 (Pioneer)
- Enhanced Defect Reporting Verifier : EDRVF-001 (Pioneer)

4.1.2 DVD-RW measuring system (Playback)

DVD-RW measuring system (Playback) shall have functions at least for executing the tests defined in **4.2.1**, **4.2.2** and **4.2.3**. Its reading beam condition shall be as defined in 2.1.3.2 of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2 and its scanning velocity shall be 3.49 m/s (1x-speed).

This system is to be equipped by each Lab and applicant individually.

4.2 Test Specifications

The following sections describe the test procedures required for verification of the 12cm SL Drive. The tests shall be performed according to the items described in **Form 3L to 7L**.

4.2.1 Recording characteristics

- Random or equivalent signal shall be written in the user area of a 12cm/1x-speed DVD-RW Standard Blank Test Disc by the SL Drive tested.
- Write Strategy variations (refer to Annex K of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2) can be used for recording. For the items that the evaluation radius are specified, the writing zones shall be at least 5 mm band in radius including the measuring points of R = 25 mm, 40 mm and 55 mm.
- Measure the characteristics of the Recorded layer using DVD-RW measuring system (Playback) or equivalent system in accordance with **Form 3L**.

4.2.2 1x-speed Linking characteristic

- This test is for 12cm/1x-speed only SL Drive. 12cm/2x/1x-speed SL Drive, 12cm/4x/2x/1x-speed SL Drive and 12cm/6x/2x/1x-speed SL Drive need not execute this test.
- Random or equivalent signal shall be written in the user area of a 12cm/1x-speed DVD-RW Standard Blank Test Disc by the SL Drive tested. And append data in the Restricted Overwrite mode according to the linking scheme that the drive adopts.
- Using DVD-RW measuring system (Playback), check whether the time difference between "the peak of LPP" and "center of 14T" is smaller than 7T (260 ns) in any place around Linked area.

If the linking is done properly, mark OK in **Form 4L**.

4.2.3 Information data in Lead-in and RMA

- The 12cm DVD-RW Standard Blank Test Disc recorded in the test of **4.2.1** shall be used for this check.
- Using DVD-RW measuring system (Playback), check the recorded information data in Lead-in and RMA of the recorded DVD-RW Standard Blank Test Disc. The applicant shall fill out each column of **Form 5L**, and Class-A Lab will check them.

4.2.4 Reading characteristics

- A 12cm DVD-RW Standard Signal Test Disc (RWSTD-011 or RWSTD-101) shall be read by the SL Drive. If the entire signal can be read properly, mark OK in **Form 6L**.

4.2.5 Compliance check of Defectiveness

- Check Enhanced Defect Reporting (EDR) function of the SL Drive using Enhanced Defect Reporting Test Disc (EDRTD-001) and Enhanced Defect Reporting Verifier (EDRVF-001).

Test result shall be described in **Form 7L**.

Refer to "Annex BB (Informative): Guideline for the defectiveness of a written ECC Block" of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2.

5. Test Tools and Test Specifications for 8cm/1x-speed SL Drive

This chapter covers the test specifications and tool requirements for the physical and logical compliance testing the 8cm/1x-speed SL Drive and the 1x-speed recording capability of 8cm/2x/1x-speed SL Drive.

5.1 Test Tools

The following tools are required to perform the tests specified and shall be available before start executing the test procedures.

5.1.1 Test Discs

The following test discs are used for testing 8cm SL Drive. As for acquisition, refer to **Annex D**.

- 8cm/1x-speed DVD-RW Standard Blank Test Disc :
 - HLX-512 A1 (based on RW Book ver.1.1) (Sony)
 - VRW-601S (based on RW Book ver.1.1) (JVC)
- 8cm DVD-RW Standard Signal Test Disc :
 - HLX-512 ARW (Sony)

5.1.2 DVD-RW measuring system (Playback)

DVD-RW measuring system (Playback) shall have functions at least for executing the tests defined in **5.2.1**, **5.2.2** and **5.2.3**. Its reading beam condition shall be as defined 2.1.3.2 of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2 and its scanning velocity shall be 3.49 m/s (1x-speed).

This system is to be equipped by each Lab and applicant individually.

5.2 Test Specifications

The following sections describe the test procedures required for verification of the 8cm SL Drive. The tests shall be performed according to the items described in **Form 8L to 11L**.

5.2.1 Recording characteristics

- Random or equivalent signal shall be written in the user area of an 8cm/1x-speed DVD-RW Standard Blank Test Disc by the SL Drive tested.
- Write Strategy variations (refer to Annex K of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2) can be used for recording. For the items that the evaluation radius are specified, the writing zones shall be at least 5 mm band in radius including the measuring points of R = 25 mm and 38 mm.
- Measure the characteristics of the Recorded layer using DVD-RW measuring system (Playback) or equivalent system in accordance with **Form 8L**.

5.2.2 1x-speed Linking characteristic

- This test is only for 8cm/1x-speed SL Drive. 8cm/2x/1x-speed SL Drive need not execute this test.
- Random or equivalent signal shall be written in the user area of an 8cm/1x-speed DVD-RW Standard Blank Test Disc by the SL Drive tested. And append data in the Restricted Overwrite mode according to the linking scheme that the drive adopts.
- Using DVD-RW measuring system (Playback), check whether the time difference between "the peak of LPP" and "center of 14T" is smaller than 7T (260 ns) in any place around Linked area.
If the linking is done properly, mark OK in **Form 9L**.

5.2.3 Information data in Lead-in and RMA

- The 8cm DVD-RW Standard Blank Test Disc recorded in the test of **5.2.1** shall be used for this check.
- Using DVD-RW measuring system (Playback), check the recorded information data in Lead-in and RMA of the recorded DVD-RW Standard Blank Test Disc. The applicant shall fill out each column of **Form 10L**, and Class-A Lab will check them.

5.2.4 Reading characteristics

- An 8cm DVD-RW Standard Signal Test Disc shall be read by the SL Drive. If the entire signal can be read properly, mark OK in **Form 11L**.

6. Test Specifications for 12cm/2x-speed recording capability of SL Drive

This chapter covers the test specifications and tool requirements for the physical and logical compliance testing the 2x-speed recording capability of 12cm/2x/1x-speed SL Drive, 12cm/4x/2x/1x-speed SL Drive and 12cm/6x/2x/1x-speed SL Drive. These Drives shall cover the 1x-speed Test Specification as well. Therefore, compliance test of 1x-speed shall be performed according to chapter 4.

6.1 Test Tools

The following tools are required to perform the tests specified and shall be available before start executing the test procedures.

6.1.1 Test Disc

The following test disc is used for testing the 2x-speed recording capability of 12cm SL Drive. As for acquisition, refer to **Annex D**.

- 12cm/4x/2x-speed Class 1 DVD-RW Standard Blank Test Disc : RWBTD-031 (Pioneer)

6.1.2 DVD-RW measuring system (Playback)

DVD-RW measuring system (Playback) shall have functions at least for executing the tests defined in **6.2.1**, **6.2.2** and **6.2.3**. Its reading beam condition shall be as defined 2.1.3.2 of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2 and its scanning velocity shall be 3.49 m/s (1x-speed).

This system is to be equipped by each Lab and applicant individually.

6.2 Test Specifications

The following sections describe the test procedures of 2x-speed recording capability required for verification of 12cm SL Drive. The tests shall be performed according to the items described in **Form 12L to 14L**.

6.2.1 Recording characteristics

This test shall be done for 12cm/4x/2x-speed DVD-RW Standard Blank Test Disc (RWBTD-031).

Write Strategy variations (refer to 2.1.5 and Annex A of Optional Specifications 2x-speed DVD-RW Rev. 1.0) can be used for recording.

- Random or equivalent signal shall be written with 2x-speed in the user area of 12cm/4x/2x-speed DVD-RW Standard Blank Test Disc by the SL Drive. For the items that the evaluation radius are specified, the writing zones shall be at least 5 mm band in radius including the measuring points of R = 25 mm, 40 mm and 55 mm.
- Measure the characteristics of the Recorded layer using DVD-RW measuring system (Playback) or equivalent and enter the measured values in accordance with **Form 12L**.

6.2.2 2x-speed Linking characteristic

- This test is only for 12cm/2x/1x-speed SL Drive. The 4x/2x/1x-speed SL Drive and the 6x/2x/1x-speed SL Drive need not execute this test.
- Random or equivalent signal shall be written with 2x-speed in the user area of a 12cm/4x/2x-speed DVD-RW Standard Blank Test Disc (RWBTD-031) by the SL Drive. And append data in the Restricted Overwrite mode according to the linking scheme that the drive adopts.
- Using DVD-RW measuring system (Playback), check whether the time difference between "the peak of LPP" and "center of 14T" is smaller than 7T (260 ns) in any place around Linked area.
If the linking is done properly, mark OK in **Form 13L**.

6.2.3 Information data in Lead-in and RMA

- The 12cm/4x/2x-speed DVD-RW Standard Blank Test Disc recorded in the test of **6.2.1** shall be used for this check.
- Using DVD-RW measuring system (Playback), check the recorded information data in Lead-in and RMA of the recorded Test Disc. The applicant shall fill out each column of **Form 14L**, and Class-A Lab will check them.

7. Test Specifications for 8cm/2x-speed recording capability of SL Drive

This chapter covers the test specifications and tool requirements for the physical and logical compliance testing the 2x-speed recording capability of 8cm/2x/1x-speed SL Drive. The 2x/1x-speed SL Drive shall cover the 1x-speed Test Specification. Therefore, compliance test of 1x-speed shall be performed according to chapter 5.

7.1 Test Tools

The following tools are required to perform the tests specified and shall be available before start executing the test procedures.

7.1.1 Test Disc

The following test disc is used for testing the 2x-speed recording capability of 8cm/2x/1x-speed SL Drive. As for acquisition, refer to **Annex D**.

- 8cm/2x/1x-speed DVD-RW Standard Blank Test Disc :
HLX-512 A2 (based on RW Book ver.1.1) (Sony)
VRW-603S (based on RW Book ver.1.1) (JVC)

7.1.2 DVD-RW measuring system (Playback)

DVD-RW measuring system (Playback) shall have functions at least for executing the tests defined in **7.2.1**, **7.2.2** and **7.2.3**. Its reading beam condition shall be as defined 2.1.3.2 of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2 and its scanning velocity shall be 3.49 m/s (1x-speed).

This system is to be equipped by each Lab and applicant individually.

7.2 Test Specifications

The following sections describe the test procedures of 2x-speed recording capability required for verification of 8cm/2x/1x-speed SL Drive. The tests shall be performed according to the items described in **Form 15L to 17L**.

7.2.1 Recording characteristics

This test shall be done for 8cm/2x-speed DVD-RW Standard Blank Test Disc.

Write Strategy variations (refer to 2.1.5 and Annex A of Optional Specifications 2x-speed DVD-RW Rev. 1.0) can be used for recording.

- Random or equivalent signal shall be written with 2x-speed in the user area of 8cm/2x-speed DVD-RW Standard Blank Test Disc by the SL Drive. For the items that the evaluation radius are specified, the writing zones shall be at least 5 mm band in radius including the measuring points of R = 25 mm and 38 mm.
- Measure the characteristics of the Recorded layer using DVD-RW measuring system (Playback) or equivalent and enter the measured values in accordance with **Form 15L**.

7.2.2 2x-speed Linking characteristic

- Random or equivalent signal shall be written with 2x-speed in the user area of an 8cm/2x-speed DVD-RW Standard Blank Test Disc by the SL Drive. And append data in the Restricted Overwrite mode according to the linking scheme that the drive adopts.
- Using DVD-RW measuring system (Playback), check whether the time difference between "the peak of LPP" and "center of 14T" is smaller than 7T (260 ns) in any place around Linked area.
If the linking is done properly, mark OK in **Form 16L**.

7.2.3 Information data in Lead-in and RMA

- The 8cm/2x-speed DVD-RW Standard Blank Test Disc recorded in the test of **7.2.1** shall be used for this check.
- Using DVD-RW measuring system (Playback), check the recorded information data in Lead-in and RMA of the recorded Test Disc. The applicant shall fill out each column of **Form 17L**, and Class-A Lab will check them.

8. Test Specifications for 12cm/4x-speed recording capability of SL Drive

This chapter covers the test specifications and tool requirements for the physical and logical compliance testing the 4x-speed recording capability of 12cm/4x/2x/1x-speed SL Drive.

The 4x/2x/1x-speed SL Drive shall cover the 1x and 2x-speed Test Specification. Therefore, compliance test of 1x-speed and 2x-speed shall be performed according to chapter 4 and 6.

8.1 Test Tools

The following tools are required to perform the tests specified and shall be available before start executing the test procedures.

8.1.1 Test Disc

The following test disc is used for testing the 4x-speed recording capability of 4x/2x/1x-speed SL Drive. As for acquisition, refer to **Annex D**.

- 12cm/4x/2x-speed Class 1 DVD-RW Standard Blank Test Disc : RWBTD-031 (Pioneer)

8.1.2 DVD-RW measuring system (Playback)

DVD-RW measuring system (Playback) shall have functions at least for executing the tests defined in **8.2.1**, **8.2.2** and **8.2.3**. Its reading beam condition shall be as defined 2.1.3.2 of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2 and its scanning velocity shall be 3.49 m/s (1x-speed).

This system is to be equipped by each Lab and applicant individually.

8.2 Test Specifications

The following sections describe the test procedures of 4x-speed recording capability required for verification of 4x/2x/1x-speed SL Drive. The tests shall be performed according to the items described in **Form 18L to 20L**.

8.2.1 Recording characteristics

This test shall be done for 12cm/4x/2x-speed DVD-RW Standard Blank Test Disc.

Write Strategy variations (refer to 2.1.5 and Annex A of Optional Specifications 4x-speed DVD-RW Rev. 2.0) can be used for recording.

- Random or equivalent signal shall be written with 4x-speed in the user area of 12cm/4x/2x-speed DVD-RW Standard Blank Test Disc by the SL Drive. For the items that the evaluation radius are specified, the writing zones shall be at least 5 mm band in radius including the measuring points of R = 25 mm, 40 mm and 55 mm.
- Recording speed at R=25 and R=40 can be carried out with the declared speed in **Form 2L**.
- Measure the characteristics of the Recorded layer using DVD-RW measuring system (Playback) or equivalent and enter the measured values in accordance with **Form 18L**.

8.2.2 4x-speed Linking characteristic

- Random or equivalent signal shall be written with 4x-speed in the user area of a 4x/2x-speed DVD-RW Standard Blank Test Disc by the SL Drive. And append data in the Restricted Overwrite mode according to the linking scheme that the drive adopts.
- Using DVD-RW measuring system (Playback), check whether the time difference between "the peak of LPP" and "center of 14T" is smaller than 7T (260 ns) in any place around Linked area.
If the linking is done properly, mark OK in **Form 19L**.
- This test shall be done in the user area where the Drive can keep performing 4x-speed recording.

8.2.3 Information data in Lead-in and RMA

- The 12cm/4x/2x-speed DVD-RW Standard Blank Test Disc recorded in the test of **8.2.1** shall be used for this check.
- Using DVD-RW measuring system (Playback), check the recorded information data in Lead-in and RMA of the recorded Test Disc. The applicant shall fill out each column of **Form 20L**, and Class-A Lab will check them.

9. Test Specifications for 12cm/6x-speed recording capability of SL Drive

This chapter covers the test specifications and tool requirements for the physical and logical compliance testing the 6x-speed recording capability of 12cm/6x/2x/1x-speed SL Drive.

The 6x/2x/1x-speed SL Drive shall cover the 1x and 2x-speed Test Specification. Therefore, compliance test of 1x-speed and 2x-speed shall be performed according to chapter 4 and 6.

9.1 Test Tools

The following tools are required to perform the tests specified and shall be available before start executing the test procedures.

9.1.1 Test Disc

The following test disc is used for testing the 6x-speed recording capability of 6x/2x/1x-speed SL Drive. As for acquisition, refer to **Annex D**.

- 12cm/6x/2x-speed Class 1 DVD-RW Standard Blank Test Disc : RWBTD-041 (Pioneer)

Note : This Test Disc also covers the 4x-speed recording, which may be used in **9.2.1** for R = 25 or 40 mm.

9.1.2 DVD-RW measuring system (Playback)

DVD-RW measuring system (Playback) shall have functions at least for executing the tests defined in **9.2.1**, **9.2.2** and **9.2.3**. Its reading beam condition shall be as defined 2.1.3.2 of DVD Specifications for Re-recordable Disc Part 1: Ver. 1.2 and its scanning velocity shall be 3.49 m/s (1x-speed).

This system is to be equipped by each Lab and applicant individually.

9.2 Test Specifications

The following sections describe the test procedures of 6x-speed recording capability required for verification of 6x/2x/1x-speed SL Drive. The tests shall be performed according to the items described in **Form 21L to 23L**.

9.2.1 Recording characteristics

This test shall be done for 12cm/6x/2x-speed DVD-RW Standard Blank Test Disc.

Write Strategy variations (refer to 2.1.5 and Annex A of Optional Specifications 6x-speed DVD-RW Rev. 3.0) can be used for recording.

- Random or equivalent signal shall be written with 6x-speed in the user area of 12cm/6x/2x-speed DVD-RW Standard Blank Test Disc by the SL Drive. For the items that the evaluation radius are specified, the writing zones shall be at least 5 mm band in radius including the measuring points of R = 25 mm, 40 mm and 55 mm.
- Recording speed at R=25 and R=40 can be carried out with the declared speed in **Form 2L**.
- Measure the characteristics of the Recorded layer using DVD-RW measuring system (Playback) or equivalent and enter the measured values in accordance with **Form 21L**.

9.2.2 6x-speed Linking characteristic

- Random or equivalent signal shall be written with 6x-speed in the user area of a 6x/2x-speed DVD-RW Standard Blank Test Disc by the SL Drive. And append data in the Restricted Overwrite mode according to the linking scheme that the drive adopts.
- Using DVD-RW measuring system (Playback), check whether the time difference between "the peak of LPP" and "center of 14T" is smaller than 7T (260 ns) in any place around Linked area.
If the linking is done properly, mark OK in **Form 22L**.
- This test shall be done in the user area where the Drive can keep performing 6x-speed recording.

9.2.3 Information data in Lead-in and RMA

- The 12cm/6x/2x-speed DVD-RW Standard Blank Test Disc recorded in the test of **9.2.1** shall be used for this check.
- Using DVD-RW measuring system (Playback), check the recorded information data in Lead in and RMA of the recorded Test Disc. The applicant shall fill out each column of **Form 23L**, and Class-A Lab will check them.

10. Test Tools and Test Specifications for 12cm/2x-speed DL Drive

This chapter covers the test specifications and tool requirements for the physical and logical compliance testing the 12cm/2x-speed DL Drive.

10.1 Test Tools

The following tools are required to perform the tests specified and shall be available before start executing the test procedures.

10.1.1 Test Discs

The following test discs are used for testing 12cm DL Drive. As for acquisition, refer to **Annex D**.

- 12cm/2x-speed DVD-RW DL Standard Blank Test Disc : VRW-805-DL (JVC)
- 12cm DVD-RW DL Standard Signal Test Disc : VRW-806S-DL (JVC)

10.1.2 DVD-RW measuring system for DL (Playback)

DVD-RW measuring system for DL (Playback) shall have functions at least for executing the tests defined in **10.2.1**, **10.2.2** and **10.2.3**. Its reading beam condition shall be as defined in 2.1.3.2 of DVD Specifications for Re-recordable Disc for Dual Layer Part 1: Ver. 2.0 and its scanning velocity shall be 3.84 m/s (1x-speed). This system is to be equipped by each Lab and applicant individually.

10.2 Test Specifications

The following sections describe the test procedures required for verification of the 12cm DL Drive. The tests shall be performed according to the items described in **Form 24L to 27L**.

10.2.1 Recording characteristics

- Random or equivalent signal shall be written in the user area of a 12cm/2x-speed DVD-RW DL Standard Blank Test Disc by the DL Drive tested. Both of Layer 0 and Layer 1 shall be recorded keeping the recording order. Refer to Annex GG of DVD Specifications for Re-recordable Disc for Dual Layer Part 1: Ver. 2.0.
- Write Strategy variations specified in 2.2.3.8 of DVD Specifications for Re-recordable Disc for Dual Layer Part 1: Ver. 2.0) can be used for recording. For the items that the evaluation radius are specified, the writing zones shall be at least 5 mm band in radius including the measuring points of R = 25 mm, 40 mm and 55 mm.
- Measure the characteristics of the Recorded layer using DVD-RW measuring system for DL (Playback) or equivalent system in accordance with **Form 24L**.

10.2.2 2x-speed Linking characteristic

- This test is for 12cm/2x-speed DL Drive.
- Testing Layer is L0.
- Random or equivalent signal shall be written in the user area of L0 of a 12cm/2x-speed DVD-RW DL Standard Blank Test Disc by the DL Drive tested. And append data in the Restricted Overwrite mode according to the linking scheme that the drive adopts.
- Using DVD-RW measuring system for DL (Playback), check whether the time difference between "the peak of LPP" and "center of 14T" is smaller than 7T (260 ns) in any place around Linked area.

If the linking is done properly, mark OK in **Form 25L**.

10.2.3 Information data in Lead-in and RMA

- The 12cm DVD-RW DL Standard Blank Test Disc recorded in the test of **10.2.1** shall be used for this check.
- Using DVD-RW measuring system for DL (Playback), check the recorded information data in Lead-in and RMA of the recorded DVD-RW DL Standard Blank Test Disc. The applicant shall fill out each column of **Form 26L**, and Class-A Lab will check them.

10.2.4 Reading characteristics

- A 12cm DVD-RW DL Standard Signal Test Disc shall be read by the DL Drive. If the entire signal can be read properly, mark OK in **Form 27L**.

Annex A

List of Class-A Verification Labs

This List is correct at the time of publication. However, when the Class-A Lab information contained here differs from such information cited in our website www.dvdfllc.co.jp, the List with more current date prevails. Also, please refer to the website for the latest Verification Service of each Class-A Lab.

DVD-RW Drive (SL Drive) and DVD-RW Drive for DL (DL Drive)

JVC KENWOOD Corporation

DVD Verification Lab.

12, 3-chome, Moriya-cho, Kanagawa-ku, Yokohama-shi, Kanagawa, 221-8528 Japan

Fax: +81-45-450-2425

PIONEER CORPORATION

Verification Laboratory

1-1 Shin-ogura, Saiwai-ku, Kawasaki-shi, Kanagawa, 212-0031 Japan

Fax: +81-44-580-4027

DVD-RW Drive (SL Drive)

Hitachi Consumer Electronics Co., Ltd.

Format Verification Center

292 Yoshida-cho, Totsuka-ku, Yokohama-shi, Kanagawa, 244-0817 Japan

Fax: +81-45-866-5905

Sony Corporation

Verification Laboratory

2-10-1 Osaki, Shinagawa-ku, Tokyo, 141-8610 Japan

Fax: +81-50-3750-6608

Annex B

Glossary of Terms used

(This page is left blank intentionally. May be defined in future.)

Annex C

Procedure for Class-A Verification Lab Product Submission

The procedure for submitting a product to a Class-A Verification Lab is as follows:

Preliminary Application

Applicant must complete **Form 1L** to provide preliminary information.

Self Test

Applicant must test the product in accordance with this Test Specification prior to submitting samples to a Class-A Verification Lab. Applicant must complete **Form 2L**, and **necessary Forms*** to provide test results.

*Note:

Form 3L to 7L are necessary for verification of 12cm/1x-speed DVD-RW Drive.

Form 8L to 11L are necessary for verification of 8cm/1x-speed DVD-RW Drive.

Form 3L, 5L, 6L, 7L and 12L to 14L are necessary for verification of 12cm/2x/1x-speed DVD-RW Drive.

Form 8L, 10L, 11L and 15L to 17L are necessary for verification of 8cm/2x/1x-speed DVD-RW Drive.

Form 3L, 5L, 6L, 7L, 12L, 14L and 18L to 20L are necessary for verification of 12cm/4x/2x/1x-speed DVD-RW Drive.

Form 3L, 5L, 6L, 7L, 12L, 14L and 21L to 23L are necessary for verification of 12cm/6x/2x/1x-speed DVD-RW Drive.

Form 24L to 27L are necessary for verification of 12cm/2x-speed DVD-RW Drive for DL.

Mutual Non-Disclosure Agreement (NDA)

Applicant, in order to maintain the confidentiality of the applicant's product and Verification Lab's information, must sign a Mutual Non-Disclosure Agreement.

Application

Applicant must submit **3** product samples along with **Form 2L**, said **necessary Forms** and the **NDA**.

Test Results

Upon completion of testing, Verification Lab will complete **Form 28L** to inform the applicant and DVD Format Logo/Licensing Corporation of the test results.

Annex D

Test Tool Contact Information

The Contact Information is correct at the time of publication. However, when the Class-A Lab information (marked <*>) differs from such information cited in our website www.dvdfllc.co.jp, the List with more current date prevails.

For 12cm SL Drive

<ul style="list-style-type: none"> 12cm DVD-RW Standard Blank Test Disc 	PIONEER CORPORATION<*>
1x-speed RWBTD-011	Verification Laboratory
4x/2x-speed Class 1 RWBTD-031	1-1 Shin-ogura, Saiwai-ku, Kawasaki-shi,
6x/2x-speed Class 1 RWBTD-041	Kanagawa, 212-0031 Japan
<ul style="list-style-type: none"> 12cm DVD-RW Standard Signal Test Disc 	Fax: +81-44-580-4027
RWSTD-011	
RWSTD-101	
<ul style="list-style-type: none"> EDR Test Disc 	
EDRTD-001	
<ul style="list-style-type: none"> EDR Verifier 	
EDRVF-001	

For 12cm DL Drive

<ul style="list-style-type: none"> 12cm DVD-RW DL Standard Blank Test Disc 	JVC KENWOOD Corporation<*>
2x-speed VRW-805-DL	DVD Verification Lab.
<ul style="list-style-type: none"> 12cm DVD-RW DL Standard Signal Test Disc 	12, 3-chome, Moriya-cho, Kanagawa-ku, Yokohama-shi,
2x-speed VRW-806S-DL	Kanagawa, 221-8528 Japan
	Fax: +81-45-450-2425

For 8cm Drive

<ul style="list-style-type: none"> 8cm DVD-RW Standard Blank Test Disc 	Sony PCL Inc.
1x-speed HLX-512 A1	Honda Denki Bldg.
	4-5-37 Kami-ohsaki, Shinagawa-ku, Tokyo, 141-8558 Japan
	Fax: +81-3-3492-9658
1x-speed VRW-601S	JVC KENWOOD Corporation<*>
2x/1x-speed (Ver. 1.1) HLX-512 A2	Sony PCL Inc.
2x/1x-speed (Ver. 1.1) VRW-603S	JVC KENWOOD Corporation<*>
<ul style="list-style-type: none"> 8cm DVD-RW Standard Signal Test Disc 	Sony PCL Inc.
HLX-512 ARW	

This page is intentionally left blank.