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Information technology — Digitally recorded media for information interchange and storage — 120 mm Triple Layer (100,0 Gbytes per disk) BD Rewritable disk

Technologies de l'information — Supports enregistrés numériquement pour échange et stockage d'information — Disques BD réinscriptibles de 120 mm triple couche (100,0 Go par disque)

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

ISO/IEC 30193 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 23, *Digitally recorded media for information interchange and storage*.

Introduction

In March of 2002, 9 companies known as the Blu-ray Disc Founders, or BDF.came together to create optical-disk formats with the large capacity and high-speed transfer rates that would be needed for recording and reproducing high-definition video content. This joint effort turned out to be fruitful and the first version of its Blu-ray Disc™ Rewritable Format Part1 Version 1.0 in June of 2002.

Then, in October of 2004, more than 100 companies joined and BDF became an open forum called the Blu-ray Disc Association (BDA). The BDA issued Version 2.1 of the Blu-ray Disc™ Rewritable Format Part1 in October 2005 and Version 3.0 in June of 2010. By the end of 2010 over 100 million the Blu-ray Disc™ have been shipped and Blu-ray™ devices such as players, recorders, game consoles and PC drives were in use all over the world.

The BDA also conducts verification activities for both disks and devices and has established more than 10 Testing Centers in Asia, Europe and the USA.

The BDA gave consumer applications the highest priority in the first few years. But it was known , of course, that International Standarization would be required before many government entities and their contractors would be allowed to use Blu-ray Disc™. In Februray, and January of 2011, the chairs of ISO/IEC JTC 1/SC23 and JIIMA (Japan Image & Information Management Association) formally requested the BDA to consider International Standardization. The reason for this was to enable the inclusion of writable BDs along with well DVDs and CDs in an International Standard specifying test methods for the estimation of lifetime of optical storage media for long-term data storage. In October 2011, the President of the BDA responded that his organization decided to pursue International Standard of the basic physical formats for the Recordable and Rewritable Blu-ray™ Formats.

In December of 2011, the BDA sent project proposals for the International standardization of 4 formats to ISO/IEC JTC 1/SC 23 via the Japan national body. They are 120 mm Single Layer (25,0 Gbytes per disk) and Dual Layer (50,0 Gbytes per disk) BD Recordable disks, 120 mm Single Layer (25,0 Gbytes per disk) and Dual Layer (50,0 Gbytes per disk) BD Rewritable disks, 120 mm Triple Layer (100,0 Gbytes per disk) and Quadruple Layer (128,0 Gbytes per disk) BD Recordable disks and 120 mm Triple Layer (100,0 Gbytes per disk) BD Rewritable disk.

This International Standard specifies the mechanical, physical and optical characteristics of a 120 mm rewritable optical disk with a capacity of 100,0 Gbytes.

A few additional specifications are required in order to write and read video-recording applications, such as BDAV Format which had been specified by the BDA for use on BD Rewritable disks. These specifications, which are related to the Application, the file system or the Content- protection system are required for the disk, the generating system and the receiving system. For more information of the Application, the Content-protection system and the additional requirements for the Blu-ray™ Format specifications, see http://www.blu-raydisc.info.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of patents.

ISO and IEC take no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured ISO and IEC that they are willing to negotiate licenses under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of holders of these patent rights are registered with ISO and IEC. Information may be obtained from:

Hitachi Consumer Electronics Co.,Ltd.
Intellectual Property Management
292 Yoshida-cho, Totsuka-ku, Yokohama 244-0817 Japan

Hitachi, Ltd.
IT Platform R&D Management Division Patent Strategy
322-2 Nakazato, Odawara-shi, Kanagawa-ken 250-0872 Japan

Panasonic Corporation
Intellectual Property Center
OBP Panasonic Tower 8th Floor, 2-1-61, Shiromi, Chuoh-ku, Osaka, 540-6208, Japan

Pioneer Corporation
Intellectual Property Division, Legal & Intellectual Property Division,
1-1, Shin-Ogura, Saiwai-ku, Kawasaki-Shi, Kanagawa, 212-0031, Japan

Sony Corporation
IP Asset Management Department, Intellectual Property Division,
1-7-1, Konan, Minato-ku, Tokyo, 108-0075, Japan

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ISO (www.iso.org/patents) and IEC (http://patents.iec.ch) maintain on-line databases of patents relevant to their standards. Users are encouraged to consult the databases for the most up to date information concerning patents.

NOTE Blu-ray™, Blu-ray Disc™ and the logos are trademarks of the Blu-ray Disc Assosiation.

Information technology — Digitally recorded media for information interchange and storage — 120mm Triple Layer (100,0 Gbytes per disk) BD Rewritable disk

1 Scope

This International Standard specifies the mechanical, physical and optical characteristics of a 120 mm rewritable optical disk with a capacity of 100,0 Gbytes. It specifies the quality of the recorded and unrecorded signals, the format of the data and the recording method, thereby allowing for information interchange by means of such disks. User data can be written, read and overwritten many times using a reversible method. This disk is identified as a BD Rewritable disk.

This International Standard specifies

- one disk Type,
- the conditions for conformance,
- the environments in which the disk is to be operated and stored,
- the mechanical and physical characteristics of the disk, so as to provide mechanical interchange between data processing systems,
- the format of the information on the disk, including the physical disposition of the Tracks and Sectors,
- the error-correcting codes and the coding method used,
- the characteristics of the signals recorded on the disk, enabling data processing systems to read data from the disk.

This International Standard provides for interchange of disks between disk drives. Together with a standard for volume and file structure, it provides for full data interchange between data processing systems.

2 Conformance

2.1 Optical Disk

A claim of conformance with this International Standard shall specify the Type implemented. An optical disk shall be in conformance with this International Standard if it meets all mandatory requirements specified for its Type.

2.2 Generating system

A generating system shall be in conformance with this International Standard if the optical disk it generates is in accordance with 2.1.

2.3 Receiving system

A receiving system shall be in conformance with this International Standard if it is able to handle the Type of optical disk according to 2.1.

2.4 Compatibility statement

A claim of conformance by a Generating or Receiving system with this International Standard shall include a statement listing any other standards supported. This statement shall specify the numbers of the standards, the optical disk Types supported (where appropriate) and whether support includes reading only or both reading and writing.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 646:1991, *Information technology — ISO 7-bit coded character set for information interchange*

ISO 9352:1995, *Plastics — Determination of resistance to wear by abrasive wheels*

IEC 60068-2-2:1974, *Environment testing — Part 2-2: Tests — Test B: Dry heat*

IEC 60068-2-30:2005, *Environment testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1
Application
application specified for a BD, for instance a video application, which requires area for a Content-protection system and for its own Defect-Management system on the disk

4.2
BD
disk having a Cover Layer around 0,1 mm thick and a Substrate around 1,1 mm thick on which data is read or recorded by an OPU using 405nm laser diode and NA = 0,85 lens

NOTE User Data recorded on the disk is formatted using 17PP modulation and an LDC+BIS code.

4.3
Channel bit
element by which the binary value ZERO or ONE is represented by Pits/Marks and Spaces on the disk

4.4
Cover Layer
transparent layer with precisely-controlled optical properties that covers the Recording Layer closest to the Entrance surface of the disk

4.5
Data Zone *n*
area between the Inner Zone and the Outer Zone on Layer L*n*

4.6
Defective Cluster
Cluster in a User-Data Area that has been registered in a Defect List as unreliable or uncorrectable one

4.7
Digital-Sum Value (DSV)
arithmetic sum obtained from a bit stream by assigning the decimal value +1 to Channel bits set to ONE and the decimal value −1 to Channel bits set to ZERO

4.8
Disk reference plane
plane defined by the perfect flat annular surface of an ideal spindle, onto which the Clamping Zone of the disk is clamped, that is normal to the axis of rotation

4.9
Embossed HFM Area
area on the disk where information has been stored by means of an HFM Groove during the manufacture of the disk

4.10
Entrance surface
surface of the disk onto which the optical beam first impinges

4.11
Erased Groove
blank Groove on the disk that has been erased by irradiating the Track using only erase power level P_{EO} as determined by the OPC algotithm

4.12
Groove
trench-like feature of the disk, connected to a Recording Layer

NOTE In case of Triple-Layer disk, one Groove can be cariied by the Substrate and other Grooves can be carried by the Spacer Lyer or the Cover Layer (see Figure 1). Grooves are used to define the Track locations.

In general, the Groove can be depression in the carrier or an elevation on the carrier.If the Groove is nearer to the Entrance surface than the Land (see Figure 52), the recording method is called “On-Groove recording”. If the Groove is farther from the Entrance surface than the Land, the recording method is called “In-Groove recording”.

In the BD Rewritable system there are 3 types of Groove:

- Wobbled Groove in Rewritable Area containig address information, and
- HFM Groove in Embossed HFM Area containing Permanent Information and Control data, and
- Straight Groove without any modulation in the BCA Zone.

4.13
HFM(High-Frequency Modulated) Groove
Groove modulated in the radial direction with a rather high bandwidth signal

NOTE HFM Groove creates a data channel with sufficient capacity and data rate for replicated information.

4.14
Information Area
area on the disk in which information can be recorded

4.15
Information Zone
actually recorded part of the Information Area

4.16
Land
surface of the Recording Layer between successive windings of a Groove