
**Information technology — Data
Interchange on 130 mm Rewritable and
Write Once Read Many Ultra Density
Optical (UDO) Disk Cartridges —
Capacity: 30 Gbytes per Cartridge — First
Generation**

*Technologies de l'information — Échange de données sur cartouches
de disques de 130 mm de diamètre, pour réécriture et pour "write once
read many", de densité ultra-optique (UDO) — Capacité: 30 Go par
cartouche — Première génération*

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

Contents

Page

Foreword.....	vii
Introduction	viii
Section 1 — General	1
1 Scope	1
2 Conformance	2
2.1 Optical disk.....	2
2.2 Generating system.....	2
2.3 Receiving system.....	2
2.4 Compatibility statement	2
3 Normative references	2
4 Terms and definitions.....	2
5 Conventions and notations	6
5.1 Representation of numbers	6
5.2 Names	6
6 Acronyms	6
7 General description	7
8 General requirement.....	8
8.1 Environments	8
8.2 Temperature shock.....	9
8.3 Safety requirements	9
8.4 Flammability	9
9 Reference Drive.....	9
9.1 Optical system	9
9.2 Optical beam	10
9.3 Read Channel	11
9.4 Tracking	11
9.5 Rotation of the disk	11
Section 2 — Mechanical and physical characteristics	11
10 Dimensional and physical characteristics of the case	11
10.1 General description of the case	11
10.2 Relationship of Sides A and B.....	11
10.3 Reference axes and case reference planes	12
10.4 Case drawings.....	12
10.5 Dimensions of the case.....	12
10.6 Mechanical characteristics	19
10.7 Drop test	20
10.8 Electro-static discharge test.....	20
11 Dimensional, mechanical, and physical characteristics of the disk	31
11.1 General description of the disk	31
11.2 Reference axis and plane of the disk.....	32
11.3 Dimensions of the disk.....	32
11.4 Mechanical characteristics	34
11.5 Optical characteristics	36
12 Interface between cartridge and drive	37
12.1 Clamping method.....	37

12.2	Clamping force	37
12.3	Capture cylinder	38
12.4	Disk position in operating condition	38
Section 3 — Format of information		40
13	Track and Header geometry	40
13.1	Track and Header shape	40
13.2	Wobble groove	41
13.3	Mirror Area	41
13.4	Direction of spiral	41
13.5	Track pitch	41
13.6	Physical Track number	42
14	Track format	43
14.1	Physical Track layout	43
14.2	Physical Block Address (PBA)	43
14.3	Sectors with Mirror Area	46
14.4	Radial alignment	47
15	Sector format	47
15.1	Sector layout	47
15.2	IDL, IDG	49
15.3	Blank fields	50
15.4	Quadrature Wobble Marks (QWM)	50
15.5	Gap	51
15.6	Guard	51
15.7	Verify and Protect (VAP)	52
15.8	VFO1, VFO2	52
15.9	Sync	53
15.10	Data field	53
15.11	Postamble (PA)	54
15.12	Buffer	54
15.13	Transition Area (TA)	55
16	Recording codes	55
16.1	Preformatted Header	55
16.2	Data field	55
17	Formatted Zone	57
17.1	General description of the Formatted Zone	57
17.2	Division of the Formatted Zone	57
17.3	Drive test data patterns	64
17.4	SDI Zones usage	64
17.5	DDS Zones Usage	66
18	Layout of the User Zones	67
18.1	General description of the User Zones	67
18.2	Divisions of the User Zones	67
18.3	User Area	67
18.4	Defect Management Area (DMA)	69
18.5	Disk Definition Structure (DDS)	71
19	Defect Management in the Rewritable (RW) and Write Once Read Many (WORM) Zones	73
19.1	Initialization of the disk	73
19.2	Certification	73
19.3	Disk not certified	74
19.4	Write procedure	75
19.5	Primary Defect List (PDL) format and content	75
19.6	Secondary Defect List (SDL) format and content	76
Section 4 — Characteristics of embossed information		77
20	Embossed information – Method of testing	77
20.1	Environment	77

20.2	Use of the Reference Drive	77
20.3	Definition of signals.....	78
21	Signals from grooves and lands	79
21.1	Ratio of groove to land signal	79
21.2	Ratio of groove/land to Mirror Area signal.....	79
21.3	Divided push-pull signal	80
21.4	Wobble signal.....	80
21.5	Phase depth.....	81
21.6	Track location.....	81
22	Signals from Headers	81
22.1	Reference reflectance t_{top}	81
22.2	Address Mark and ID signals.....	81
22.3	QWM signals	82
22.4	Timing mean and jitter.....	83
Section 5 — Characteristics of the recording layer		83
23	Method of testing	83
23.1	Environment	83
23.2	Reference Drive.....	83
23.3	Write conditions.....	84
23.4	Erase power for Type RW media.....	86
23.5	Read power damage	86
24	Phase Change characteristics.....	86
24.1	Mark polarity.....	86
24.2	Rewrite cycles for Type RW media	86
25	Write characteristics.....	86
25.1	Resolution	86
25.2	Narrow-Band Signal-to-Noise Ratio (NBSNR)	87
25.3	Cross-talk ratio.....	88
25.4	Timing mean.....	88
25.5	Timing jitter	89
25.6	Asymmetry	89
26	Erase power determination for Type RW media.....	89
26.1	Cross-Erase for Type RW Media	90
Section 6 — Characteristics of user data.....		91
27	User Data – Method of testing	91
27.1	Environment	91
27.2	Reference Drive.....	91
28	Minimum quality of a sector	92
28.1	Headers ID	92
28.2	User-written data.....	93
28.3	Wobble signal.....	93
29	Data interchange requirements.....	93
29.1	Tracking	93
29.2	User-written data.....	93
29.3	Quality of disk	93
Annex A (normative) Air cleanliness class 100 000		94
Annex B (normative) Edge distortion test		96
Annex C (normative) Compliance test		98
Annex D (normative) Cartridge electro-static discharge test		101
Annex E (normative) Test method for measuring the adsorbent force of the hub		102
Annex F (normative) CRC for ID fields		104

Annex G (normative)	Data field scrambler implementation	105
Annex H (normative)	Interleave, CRC, ECC, Resync, and Reference for the Data field.....	107
Annex I (normative)	Drive Information Record (DIR) usage	112
Annex J (normative)	Determination of the Resync and Reference patterns.....	114
Annex K (normative)	Specific Disk Information	116
Annex L (normative)	Read Channel for measuring analog signals and jitter	132
Annex M (normative)	Timing mean and timing jitter measuring procedure.....	133
Annex N (normative)	Implementation Independent Mark Quality Determination (IIMQD) for the interchange of recorded media.....	134
Annex O (normative)	Definition of the write pulse shape	136
Annex P (normative)	Asymmetry measuring definition	137
Annex Q (normative)	Enhanced Selective Inter-Symbol Interference Cancellation (ESISIC) algorithm	138
Annex R (normative)	Requirements for interchange	140
Annex S (informative)	Office environment	142
Annex T (informative)	Derivation of the operating climatic environment.....	143
Annex U (informative)	Transportation	148
Annex V (informative)	Track deviation measurement.....	149
Annex W (informative)	Measurement of the vertical birefringence of the cover layer	153
Annex X (informative)	Quadrature Wobble offset control.....	154
Annex Y (informative)	Start Position Shift (SPS) implementation.....	157
Annex Z (informative)	Sector retirement guidelines	158
Annex AA (informative)	Guidelines for the use of Type WORM ODCs	159
Annex BB (informative)	Media type identification in existing and future standards.....	160
Annex CC (informative)	Laser power calibration for evaluation of media power parameters	161

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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 17345 was prepared by Ecma TC 31 (as ECMA-350) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

This second edition cancels and replaces the first edition (ISO/IEC 17345:2005), which has been technically revised.

Introduction

Ecma Technical Committee TC 31 was established in 1984 for the standardization of Optical Disks and Optical Disk Cartridges (ODC). Since its establishment, the Committee has made major contributions to ISO/IEC JTC 1/SC 23 toward the development of International Standards for optical disks with a diameter of 80 mm, 90 mm, 120 mm, 130 mm, 300 mm and 356 mm. Numerous standards have been developed by TC 31 and published by Ecma, almost all of which have also been adopted by ISO/IEC under the fast-track procedure as International Standards. The following International Standards for 130 mm disks have been published by Ecma and adopted by ISO/IEC JTC 1: ISO/IEC 11560:1992, ISO/IEC 13481:1993, ISO/IEC 13549:1993, ISO/IEC 13842:1995, ISO/IEC 15486:1998, ISO/IEC 18093:1999, ISO/IEC 22092:2002.

This International Standard specifies two types of double-sided ODCs — Rewritable (Type RW) and Write Once Read Many (Type WORM), both using thermo-optical Phase Change effects.

Information technology — Data Interchange on 130 mm Rewritable and Write Once Read Many Ultra Density Optical (UDO) Disk Cartridges — Capacity: 30 Gbytes per Cartridge — First Generation

Section 1 — General

1 Scope

This International Standard specifies the mechanical, physical, and optical characteristics of a 130 mm optical disk cartridge (ODC) that employs thermo-optical Phase Change effects to enable data interchange between such disks.

This International Standard specifies two types:

- Type RW (Rewritable) provides for data to be written read and erased many times over the recording surfaces of the disk.
- Type WORM (Write Once Read Many) provides for data once written to be read a multiplicity of times. This type uses a Write Once Read Many times recording material (written marks cannot be erased and attempted modifications of the written marks are detectable). Multisession (incremental write operations) recording may be performed on Type WORM disks.

The disk is two-sided with a nominal capacity of 15,0 Gbytes per side and the cartridge (two sides) provides a nominal capacity of 30,0 Gbytes.

This International Standard specifies:

- the conditions for conformance testing and the Reference Drive;
- the environments in which the cartridges are to be operated and stored;
- the mechanical, physical and dimensional characteristics of the cartridge so as to provide mechanical interchangeability between data processing systems;
- the format of the information on the disk, both embossed and user-written, including the physical disposition of the tracks and sectors, the error correction codes, the modulation methods used;
- the characteristics of the embossed information on the disk;
- the thermo-optical characteristics of the disk, enabling processing systems to write data onto the disk; and
- the minimum quality of user-written data on the disk, enabling data processing systems to read data from the disk.

This International Standard provides for interchange between optical 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

An ODC shall be in conformance with this International Standard if it meets all mandatory requirements specified therein.

A claim of conformance with this International Standard shall specify the Type, RW, WORM, implemented.

2.2 Generating system

A claim of conformance with this International Standard shall specify which Type(s) is (are) supported. A system generating an ODC for interchange shall be in conformance with this International Standard if it meets the mandatory requirements of this International Standard for the Type(s) supported.

2.3 Receiving system

A claim of conformance with this International Standard shall specify which Type(s) is (are) supported.

A system receiving an ODC for interchange shall be in conformance with this International Standard if it is able to process any recording made on the cartridge according to 2.1 on the Type(s) specified.

2.4 Compatibility statement

A claim of conformance with this International Standard shall include a statement listing any other Optical Disk Cartridge Standard supported by the system for which conformance is claimed. This statement shall specify the number of the Standard(s), including, where appropriate, the ODC Type(s), 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.

ECMA-287 (2002), *Safety of electronic equipment*