This is a preview - click here to buy the full publication

INTERNATIONAL STANDARD

ISO/IEC 25434

Third edition
2008-12-15

Information technology — Data interchange on 120 mm and 80 mm optical disk using +R DL format — Capacity: 8,55 Gbytes and 2,66 Gbytes per side (recording speed up to 16X)

Technologies de l'information — Échange de données sur disque optique de 120 mm et 80 mm utilisant le format +R DL — Capacité: 8,55 Go et 2,66 Go par face (vitesse d'enregistrement inférieure ou égale à 16X)

Reference number
ISO/IEC 25434:2008(E)

© ISO/IEC 2008

This is a preview - click here to buy the full publication

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.

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2008

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

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

Contents

Page

Foreword viii
Introduction ix
1 Scope 1
2 Conformance 1
2.1 Optical Disk 1
2.2 Generating system 1
2.3 Receiving system 2
2.4 Compatibility statement 2
3 Normative references 2
4 Terms and definitions 2
5 Conventions and notations 5
5.1 Representation of numbers 5
5.2 Names 5
6 Abbreviated terms 6
7 General description of the optical disk 6
8 General Requirements 7
8.1 Environments 7
8.1.1 Test environment 7
8.1.2 Operating environment 8
8.1.3 Storage environment 8
8.1.4 Transportation 8
8.2 Safety requirements 8
8.3 Flammability 8
8.4 Light fastness 8
9 Reference Drive 9
9.1 Optical system 9
9.2 Optical beam 9
9.3 Read channel 1 10
9.4 Disk clamping 10
9.5 Rotation of the disk 11
9.6 Wobble channel (Read channel 2) 11
9.7 Tracking channel (Read channel 2) 11
9.8 Reference servo systems 11
9.8.1 Normalized servo transfer function 11
9.8.2 Reference Servo for Axial Tracking 12
9.8.3 Reference Servo for Radial Tracking 13
10 Dimensional characteristics 14
10.1 Reference Planes 15
10.2 Overall dimensions 16
10.3 First transition area 16
10.4 Second transition area 17
10.5 Clamping Zone 17
10.6 Third transition area 17
10.7 Information Zone 17
10.7.1 Sub-division of the Information Zone 18
10.7.2 Track mode 19
10.8 Rim area 19
10.9 Remark on tolerances 19

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

11 Mechanical characteristics 19
11.1 Mass 19
11.2 Moment of inertia 19
11.3 Dynamic imbalance 19
11.4 Axial runout 19
11.4.1 Tracking requirements at the Reference velocity (CLV) 20
11.4.2 Tracking requirements at 3 000 RPM (CAV) 20
11.5 Radial runout 20
11.5.1 Tracking requirements at the Reference velocity (CLV) 20
11.5.2 Tracking requirements at 3 000 RPM (CAV) 21

12 Optical characteristics in the Information Zone 21
12.1 Index of refraction 21
12.2 Thickness of the substrate 22
12.3 Reflectivity 22
12.4 Birefringence 22
12.5 Angular deviation 22

13 Data format 24
13.1 Data Frames 24
13.1.1 Identification Data (ID) 24
13.1.2 ID Error Detection Code (IED) 25
13.1.3 RSV 26
13.1.4 Error Detection Code (EDC) 26
13.2 Scrambled Frames 26
13.3 ECC Blocks 27
13.4 Recording Frames 28
13.5 Modulation and NRZI conversion 29
13.6 Physical Sectors 30
13.7 Layout of a Recording UNit (RUN) 31
13.7.1 Recording Unit position 32
13.8 d.c. component suppression control 32

14 Track format 33
14.1 Track shape 33
14.2 Track path 34
14.3 Track pitch 34
14.4 Track layout 34
14.4.1 ADIP information 34
14.4.2 Physical format information in ADIP 37

15 General description of the Information Zone 66

16 Layout of the Information Zone of a Single-session disk 67
16.1 Usage of the Data Zone 68
16.1.1 Additional Testing Zone on Layer 1 (optional) 69
16.2 Physical Sector Numbers (PSNs) 70

17 Inner Drive Areas 71
17.1 Initial Zone / Final Zone 71
17.2 Inner Disk Test Zones 72
17.3 Count Zone Run-in / Dummy Zone 72
17.4 Inner Disk Count Zones 72
17.5 Inner Disk Administration Zone 72
17.6 Table of Contents (TOC) Zone 73
17.6.1 Table of Contents Blocks 73
17.6.2 Recorded Area Indicators (optional) 77

18 Lead-in Zone 78
18.1 Guard Zone 1 79
18.2 Reserved Zone 1 79
18.3 Reserved Zone 2 79
18.4 Inner Disk Identification Zone 79

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

18.5 Reserved Zone 3 79
18.6 Reference Code Zone 80
18.7 Buffer Zone 1 80
18.8 Control Data Zone 80
18.8.1 Physical format information 80
18.8.2 Disk manufacturing information 83
18.8.3 Content provider information 83
18.9 Buffer Zone 2 83

19 Data Zone 83

20 Middle Zones 83
20.1 Buffer Zones 3 85
20.2 Reserved Zones 85
20.3 Guard Zones 2 85

21 Outer Drive Areas 85
21.1 Outer Disk Administration Zones 85
21.2 Outer Disk Count Zones 86
21.3 Dummy Zone / Count Zone Run-in 87
21.4 Outer Disk Test Zone 87
21.5 Guard Zones 3 87

22 Lead-out Zone 87
22.1 Lead-out Zone at finalization 87
22.2 Lead-out Zone at closing of first Session 88

23 Multi-session Layout 89
23.1 Intro 90
23.1.1 Buffer Zone A 90
23.1.2 Inner Session Identification Zone 90
23.1.3 Session Control Data Zone 90
23.1.4 Buffer Zone B 90
23.2 Data Zone 90
23.3 Closure 90
23.3.1 Buffer Zone C 90
23.3.2 Outer Session Identification Zone 90

24 Sequential recording in Fragments 91
24.1 Opening a Session 91
24.1.1 Incomplete Fragment 91
24.1.2 Reserved Fragments 91
24.1.3 Recording User Data in Fragments 92
24.1.4 Closing a Fragment 92
24.2 Closing a Session 93
24.2.1 Lead-in/Intro Zone 93
24.2.2 Closure Zone 94
24.3 Finalizing the disk 94

25 Assignment of Logical Sector Numbers (LSNs) 94

26 Disk Control Blocks 94
26.1 General format of Disk Control Blocks 94
26.2 Format of the Session DCB (SDCB) 96
26.2.1 Session Items 98

27 General 100

28 Method of testing 100
28.1 Environment 100
28.2 Reference Drive 100
28.2.1 Optics and mechanics 100
28.2.2 Read power 101
28.2.3 Read channels 101
28.2.4 Tracking 101

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

28.3 Definition of signals....101

29 Characteristics of the groove signals....102
29.1 Phase depth....102
29.2 Push-pull signal....102
29.3 Track Cross signal....102
29.4 Normalized wobble signal....102
29.5 Characteristics of the wobble....103

30 Method of testing....103
30.1 Environment....103
30.2 Reference Drive....103
30.2.1 Optics and mechanics....103
30.2.2 Read power....103
30.2.3 Read channels....104
30.2.4 Tracking....104
30.2.5 Scanning velocity....104
30.3 Write conditions....104
30.3.1 Write pulse waveform....104
30.3.2 Write power....105
30.3.3 Write power dependency on wavelength....105
30.3.4 Write power window....106
30.3.5 Write power shift for layer L1 due to recording on layer L0....107
30.4 Measurement conditions....107

31 Characteristics of the recorded signals....107
31.1 Channel bit length....107
31.2 Definition of signals....107
31.2.1 High frequency signals (HF)....107
31.2.2 Modulated amplitude....108
31.2.3 Signal asymmetry....108
31.2.4 Normalized Slicing Level jump....108
31.2.5 Jitter....109
31.2.6 Track Cross signal....109
31.3 Read stability....109

32 Additional testing conditions....109
32.1 Test environment....109
32.1.1 Optics....109
32.2 Definition of signals....110
32.2.1 Modulated amplitude....110
32.2.2 Signal asymmetry....110
32.2.3 Jitter....110
32.2.4 Track Cross signal....110
32.2.5 Differential phase tracking error signal....111
32.2.6 Tangential push-pull signal....112

33 Quality of the recording layer....112
33.1 Defects....112
33.2 Data errors....112

34 Method of testing....113
34.1 Environment....113
34.2 Reference Drive....113
34.2.1 Optics and mechanics....113
34.2.2 Read power....113
34.2.3 Read channels....113
34.2.4 Error correction....114
34.2.5 Tracking....114

35 Minimum quality of a Recording Unit....114
35.1 Tracking....114
35.2 User-written data....114

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

Annex A (normative) **80 mm +R DL disk** **115**
Annex B (normative) **Structure for Extended format information in the Data Zone** **119**
Annex C (normative) **Measurement of light reflectivity** **122**
Annex D (normative) **Measurement of birefringence** **124**
Annex E (normative) **Measuring conditions for operation signals** **127**
Annex F (normative) **Measurement of the differential phase tracking error** **130**
Annex G (normative) **The write pulse wave form for testing** **134**
Annex H (normative) **8-to-16 Modulation** **140**
Annex I (normative) **Optimum Power Control and Recording Conditions** **148**
Annex J (informative) **Running OPC** **151**
Annex K (informative) **Wavelength dependency** **152**
Annex L (informative) **Explanation about the usage of the reference servos** **157**
Annex M (informative) **Measurement of the groove wobble amplitude** **167**
Annex N (informative) **Light fastness of the disk** **169**
Annex O (informative) **Transportation** **170**
Annex P (informative) **Video Content Protection System** **171**
Annex Q (informative) **How to use the Physical format information in ADIP** **172**
Annex R (informative) **Values to be Implemented in Existing and Future Specifications** **174**
Bibliography **177**

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

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 25434 was prepared by Ecma International (as ECMA-364) 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 third edition cancels and replaces the second edition (ISO/IEC 25434:2007), which has been technically revised.

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

Introduction

Ecma Technical Committee TC31 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 toward the development of International Standards for 80 mm, 90 mm, 120 mm, 300 mm, and 356 mm media. Numerous standards have been developed by TC31 and published by Ecma, almost all of which have also been adopted by ISO/IEC under the fast-track procedure as International Standards.

In July 2004 a group of companies proposed to TC31 to develop a standard for 120 mm dual layer recordable optical disks using the WORM recording technology and based on the DVD – Read-Only standard (ISO/IEC 16448), the +RW format (ISO/IEC 17341) and the +R format (ISO/IEC 17344). TC31 adopted this project and started the work that has resulted in the adoption of ISO/IEC 25434.

This International Standard specifies two Types of recordable optical disks, one (Type S9) making use of recording on only a single side of the disk and yielding a nominal capacity of 8,55 or 2,66 Gbytes per disk and the other (Type D18) making use of recording on both sides of the disk and yielding a nominal capacity of 17,1 or 5,32 Gbytes per disk.

In October 2005 a proposal was made to TC31 to update ISO/IEC 25434 for recording speeds up to eight times the Reference velocity. TC31 adopted this project which resulted in the adoption of ISO/IEC 25434:2007.

In February 2007 a proposal was made to TC31 to update ISO/IEC 25434 for recording speeds up to 16 times the Reference velocity.

This International Standard, taken together with a standard for volume and file structure, such as, for instance, developed in Ecma Technical Committee TC15, provides the requirements for information interchange between systems.

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

Information technology — Data interchange on 120 mm and 80 mm optical disk using +R DL format — Capacity: 8,55 Gbytes and 2,66 Gbytes per side (recording speed up to 16X)

1 Scope

This International Standard specifies the mechanical, physical and optical characteristics of 120 mm recordable optical disks with capacities of 8,55 Gbytes and 17,1 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. The data can be written once and read many times using a non-reversible method. These disks are identified as +R DL.

This International Standard also specifies 80 mm disks with capacities of 2,66 Gbytes and 5,32 Gbytes. These disks have the same characteristics as the 120 mm disks, except for some parameters related to the smaller dimensions. All parameters unique for the 80 mm disks are specified in Annex A.

This International Standard specifies the following:

- two related but different Types of this disk (see Clause 7);
- the conditions for conformance;
- the environments in which the disk is to be tested, operated and stored;
- the mechanical, physical and dimensional 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;
- the characteristics of the signals recorded on the disk, thus enabling data processing systems to read the data from the disk.

This International Standard provides for the interchange of disks 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

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

2.2 Generating system

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

© ISO/IEC 2008 – All rights reserved

This is a preview - click here to buy the full publication

2.3 Receiving system

A receiving system is in conformance with this International Standard if it is able to handle both Types 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 4873:1991, *Information technology — ISO 8-bit code for information interchange — Structure and rules for implementation*

ISO/IEC 16448:2002, *Information technology — 120 mm DVD — Read-only disk*

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

NOTE Unauthorized copying and/or redistribution of video data that is recorded in the DVD+R/+RW Video Format can be prevented by applying the Video Content Protection System as referred to in Annex P.

© ISO/IEC 2008 – All rights reserved