ISO/IEC 17592:2004-07 (E)

Information technology - 120 mm (4,7 Gbytes per side) and 80 mm (1,46 Gbytes per side) DVD rewritable disk (DVD-RAM)

Contents

Page

Section 1 - General 1

1 Scope 1

2 Conformance 1
2.1 Optical Disk 1
2.2 Generating system 1
2.3 Receiving system 2

3 Normative references 2

4 Terms and definitions 2

5 Conventions and notations 4
5.1 Representation of numbers 4
5.2 Names 4

6 List of acronyms 4

7 General description of the optical disk 5

8 General requirements 6
8.1 Environments 6
8.1.1 Test environment 6
8.1.2 Operating environment 6
8.1.3 Storage environment 6
8.1.4 Transportation 6
8.2 Safety requirement 6
8.3 Flammability 6

9 Reference Drive 7
9.1 Optical Head 7
9.2 Read channels 8
9.3 Rotation speed 8
9.4 Disk clamping 8
9.5 Normalized servo transfer function 8
9.6 Reference Servo for axial tracking 8
9.7 Reference Servo for radial tracking 10

Section 2 - Dimensional, mechanical and physical characteristics of the disk 11

10 Dimensional characteristics 11
10.1 Overall dimensions 12
10.2 First transition area 13
10.3 Second transition area 13
10.4 Clamping Zone 13
10.5 Third transition area 13
10.6 Rim area 14
10.7 Remark on tolerances 14
10.8 Label 14

11 Mechanical characteristics 14
11.1 Mass 14
11.2 Moment of inertia 14
11.3 Dynamic imbalance 15
11.4 Sense of rotation 15
11.5 Runout 15
11.5.1 Axial runout 15
11.5.2 Radial runout 15

12 Optical characteristics 15
12.1 Index of refraction 15
12.2 Thickness of the transparent substrate 15
12.3 Angular deviation 15
12.4 Birefringence of the transparent substrate 16
12.5 Reflectivity 16

Section 3 - Format of information 17

13 Data format 17
13.1 Data Frames 17
13.1.1 Data ID 18
13.1.2 Data ID Error Detection code (IED) 18
13.1.3 Reserved bytes 19
13.1.4 Error Detection Code (EDC) 19
13.2 Scrambled Frames 19
13.3 ECC Blocks 20
13.4 Recording Frames 21
13.5 Recording code and NRZI conversion 22
13.6 Recorded Data Field 23
13.7 DC component suppress Control (DCC) 24
13.7.1 DCC for the data in the Rewritable Area 24
13.7.2 DCC for the data in the Embossed Area 24
13.7.3 PID and PED recording 25

14 Track format 25
14.1 Track shape 25
14.2 Track path 25
14.3 Track pitch 26
14.4 Track layout 26
14.5 Rotation speed 26
14.6 Radial alignment 28
14.7 Sector number 28

15 Sector format 29
15.1 Sector layout 29
15.1.1 Sector layout in the Rewritable Area 29
15.1.2 Sector layout in the Embossed Area 30
15.2 VFO fields 30
15.3 Address Mark (AM) 31
15.4 Physical ID (PID) fields 31
15.5 PID Error Detection code (PED) fields 32
15.6 Postamble 1 and Postamble 2 (PA 1, PA 2) fields 32
15.7 Mirror field 34
15.8 Gap field 34
15.9 Guard 1 field 34
15.10 Pre-Synchronous code (PS) field 34
15.11 Data field 34
15.12 Postamble 3 (PA 3) field 34
15.13 Guard 2 field 34
15.14 Recording polarity randomization 35
15.15 Buffer field 35

16 Format of the Information Zone 35
16.1 Division of the Information Zone 35
16.2 Lead-in Zone 38
16.2.1 Structure of Lead-in Zone 38
16.2.2 Initial Zone 39
16.2.3 Reference Code Zone 39
16.2.4 Buffer Zone 1 39
16.2.5 Buffer Zone 2 39
16.2.6 Control Data Zone 39
16.2.7 Connection Zone 52
16.2.8 Guard Track Zones 1 and 2 53
16.2.9 Disk Test Zone 53
16.2.10 Drive Test Zone 53
16.2.11 Disk Identification Zone 54
16.2.12 DMA 1 and DMA 2 56
16.3 Data Zone 56
16.3.1 Structure of Data Zone and of the Defect Management Areas (DMAs) 56
16.3.2 Guard Track Zones 57
16.3.3 Partitioning 57
16.3.4 Number of blocks in the supplementary spare area 60
16.4 Lead-out Zone 61
16.4.1 Structure of Lead-out Zone 61
16.4.2 DMA 3 and DMA 4 61
16.4.3 Reserved Zone 61
16.4.4 Guard Track Zone 1 61
16.4.5 Drive Test Zone 61
16.4.6 Disk Test Zone 61
16.4.7 Guard Track Zone 2 62

17 Defect management 62
17.1 Defect Management Areas (DMAs) 62
17.2 Disk Definition Structure (DDS) 63
17.3 Spare sectors 65
17.4 Slipping Algorithm 66
17.5 Linear Replacement Algorithm 67
17.6 Primary Defect List (PDL) 68
17.7 Secondary Defect List (SDL) 69
17.8 Formatting of the disk 72
17.8.1 Initialization 72
17.8.2 Re-initialization 73
17.8.3 Data field number resulting from Initialization and Re-initialization 73
17.9 Write procedure 74
17.10 Read procedure 74
17.10.1 Read procedure 74
17.10.2 Blank ECC Block 74

Section 4 - Characteristics of embossed information 75

18 Method of testing 75
18.1 Environment 75
18.2 Reference Drive 75
18.2.1 Optics and mechanics 75
18.2.2 Read power 75
18.2.3 Read channels 75
18.2.4 Tracking channel 75
18.2.5 Tracking 75
18.3 Definition of signals 75

19 Signals from lands and grooves 80
19.1 Push-pull signal 80
19.2 Divided push-pull signal 80
19.3 On-track signal 80

19.4 Phase depth 81
19.5 Wobble signal 81

20 Signals from Header fields 81
20.1 VFO 1 and VFO 2 82
20.2 Address Mark, PID, PED and Postamble 82
20.3 Signals from Header 1, Header 2, Header 3 and Header 4 83
20.4 Phase depth 84

21 Signals from Embossed Area 84
21.1 High Frequency (HF) signal 84
21.1.1 Modulated amplitude 84
21.1.2 Signal asymmetry 84
21.1.3 Cross-track signal 84
21.2 Jitter 84
21.3 Servo signal 84
21.3.1 Differential phase tracking error signal 85
21.3.2 Tangential push-pull signal 85

Section 5 - Characteristics of the recording layer 87

22 Method of testing 87
22.1 Environment 87
22.2 Reference Drive 87
22.2.1 Optics and mechanics 87
22.2.2 Read power 87
22.2.3 Read channel 87
22.2.4 Tracking 87
22.3 Write conditions 87
22.3.1 Write pulse 87
22.3.2 Write power 88
22.3.3 Adaptive write control table 89
22.3.4 Adaptive write pulse control mode 90
22.4 Definition of signals 90

23 Write characteristics 91
23.1 Modulated amplitude and Signal asymmetry 91
23.2 Jitter 91

Section 6 - Characteristics of user data 92

24 Method of testing 92

Annex A (normative) Measurement of the angular deviation 93

Annex B (normative) Measurement of birefringence 95

Annex C (normative) Measurement of the differential phase tracking error 97

Annex D (normative) Reflectivity calibration and measuring method 101

Annex E (normative) Tapered cone for disk clamping 103

Annex F (normative) Measuring conditions for the operation signals 104

Annex G (normative) 8-to-16 Recording code with RLL (2,10) requirements 106

Annex H (normative) Definition of the write pulse 116

Annex J (normative) Burst Cutting Area (BCA) 119

Annex K (informative) Guideline for randomization of the Gap length, the Guard 1 length and the recording polarity 127

Annex L (informative) Transportation 128

Annex M (informative) Guideline for sector replacement 129