ISO/IEC 17344:2009-06 (E)

Information technology - Data interchange on 120 mm and 80 mm optical disk using +R forma t - Capacity: 4,7 Gbytes and 1,46 Gbytes per side (recording speed up to 16X)

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 4
5.1 Representation of numbers 4
5.2 Names 5

6 Abbreviated terms 5

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 7
8.1.3 Storage environment 7
8.1.4 Transportation 7
8.2 Safety requirements 8
8.3 Flammability 8
8.4 Light fastness 8

9 Reference Drive 8
9.1 Optical system 8
9.2 Optical beam 9
9.3 Read channel 1 9
9.4 Disk clamping 9
9.5 Rotation of the disk 10
9.6 Wobble channel (Read channel 2) 10
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 11
9.8.3 Reference Servo for Radial Tracking 12

10 Dimensional characteristics 14
10.1 Reference Planes 14

10.2 Overall dimensions 15
10.3 First transition area 15
10.4 Second transition area 16
10.5 Clamping Zone 16
10.6 Third transition area 16
10.7 Information Zone 16
10.8 Rim Area 17
10.9 Remark on tolerances 17
11 Mechanical characteristics 17
11.1 Mass 17
11.2 Moment of inertia 17
11.3 Dynamic imbalance 17
11.4 Axial runout 17
11.4.1 Tracking requirements at the Reference velocity (CLV) 17
11.4.2 Tracking requirements at 3 000 RPM (CAV) 18
11.5 Radial runout 18
11.5.1 Tracking requirements at the Reference velocity (CLV) 18
11.5.2 Tracking requirements at 3 000 RPM (CAV) 19
12 Optical characteristics in the Information Zone 19
12.1 Index of refraction 19
12.2 Thickness of the substrate 19
12.3 Reflectivity 20
12.4 Birefringence 20
12.5 Angular deviation 20
13 Data format 21
13.1 Data Frames 21
13.1.1 Identification Data (ID) 22
13.1.2 ID Error Detection Code (IED) 22
13.1.3 RSV 23
13.1.4 Error Detection Code (EDC) 23
13.2 Scrambled Frames 23
13.3 ECC Blocks 24
13.4 Recording Frames 25
13.5 Modulation and NRZI conversion 26
13.6 Physical Sectors 27
13.7 Layout of a Recording UNit (RUN) 28
13.7.1 Recording Unit position 29
13.8 d.c. component suppression control 29
14 Track format 30
14.1 Track shape 30
14.2 Track path 31
14.3 Track pitch 31
14.4 Track layout 31
14.4.1 ADIP information 31
14.4.2 Physical format information in ADIP 34
15 General description of the Information Zone 56
16 Layout of the Information Zone of a Single-session disk 56
16.1 Physical Sector Numbers (PSNs) 56
17 Inner Drive Area 57
17.1 Initial Zone 58
17.2 Inner Disk Test Zone 58
17.3 Count Zone Run-in 58
17.4 Inner Disk Count Zone 58
17.5 Inner Disk Administration Zone 59
17.6 Table of Contents (TOC) Zone 59
17.6.1 Table of Contents Blocks 60
17.6.2 Recorded Area Indicators (optional) 62
18 Lead-in Zone 63
18.1 Guard Zone 1 63
18.2 Reserved Zone 1 63
18.3 Reserved Zone 2 63
18.4 Inner Disk Identification Zone 64

18.5 Reserved Zone 3 64
18.6 Reference Code Zone 64
18.7 Buffer Zone 1 64
18.8 Control Data Zone 64
18.8.1 Physical format information 64
18.8.2 Disk manufacturing information 66
18.8.3 Content provider information 66
18.9 Buffer Zone 2 66
19 Data Zone 67

20 Lead-out Zone 67
20.1 Buffer Zone 3 67
20.2 Outer Disk Identification Zone 67
20.3 Guard Zone 2 67
21 Outer Drive Area 68
21.1 Outer Disk Administration Zone 68
21.2 Outer Disk Count Zone 68
21.3 Outer Disk Test Zone 69
21.4 Guard Zone 3 69
22 Multi-session Layout 69
22.1 Intro 70
22.1.1 Buffer Zone A 71
22.1.2 Inner Session Identification Zone 71
22.1.3 Session Control Data Zone 71
22.1.4 Buffer Zone B 71
22.2 Data Zone 71
22.3 Closure 71
22.3.1 Buffer Zone C 71
22.3.2 Outer Session Identification Zone 71
23 Sequential recording in Fragments 71
23.1 Opening a Session 72
23.1.1 Incomplete Fragment 72
23.1.2 Reserved Fragments 72
23.1.3 Recording User Data in Fragments 73
23.1.4 Closing a Fragment 73
23.2 Closing a Session 74
23.2.1 Lead-in/Intro Zone 74
23.2.2 Closure Zone 74
23.3 Finalizing the disk 75
24 Assignment of Logical Sector Numbers (LSNs) 75
25 Disk Control Blocks 75
25.1 General format of Disk Control Blocks 75
25.2 Format of the Session DCB (SDCB) 77
25.2.1 Session Items 79
26 General 80
27 Method of testing 81
27.1 Environment 81
27.2 Reference Drive 81
27.2.1 Optics and mechanics 81
27.2.2 Read power 81
27.2.3 Read channels 81
27.2.4 Tracking 81
27.3 Definition of signals 81
28 Characteristics of the groove signals 82
28.1 Phase depth 82
28.2 Push-pull signal 82
28.3 Track Cross signal 83
28.4 Normalized wobble signal 83
28.5 Characteristics of the wobble 83
29 Method of testing 83
29.1 Environment 83
29.2 Reference Drive 84

29.2.1 Optics and mechanics 84
29.2.2 Read power 84
29.2.3 Read channels 84
29.2.4 Tracking 84
29.2.5 Scanning velocity 84
29.3 Write conditions 84
29.3.1 Write pulse waveform 84
29.3.2 Write power 85
29.3.3 Write power dependency on wavelength 86
29.3.4 Write power window 86
29.4 Measurement conditions 87

30 Characteristics of the recorded signals 87
30.1 Channel bit length 87
30.2 Definition of signals 87
30.2.1 High frequency signals (HF) 87
30.2.2 Modulated amplitude 87
30.2.3 Signal asymmetry 88
30.2.4 Normalized Slicing Level jump 88
30.2.5 Jitter 88
30.2.6 Track Cross signal 89
30.3 Read stability 89
31 Additional testing conditions 89
31.1 Test environment 89
31.1.1 Optics 89
31.2 Definition of signals 89
31.2.1 Modulated amplitude 90
31.2.2 Signal asymmetry 90
31.2.3 Jitter 90
31.2.4 Track Cross signal 90
31.2.5 Differential phase tracking error signal 90
31.2.6 Tangential push-pull signal 91
32 Quality of the recording layer 92
32.1 Defects 92
32.2 Data errors 92
33 Method of testing 93
33.1 Environment 93
33.2 Reference Drive 93
33.2.1 Optics and mechanics 93
33.2.2 Read power 93
33.2.3 Read channels 93
33.2.4 Error correction 93
33.2.5 Tracking 93
34 Minimum quality of a Recording Unit 94
34.1 Tracking 94
34.2 User-written data 94

Annex A (normative) 80 mm +R disk 95

Annex B (normative) Structure for Extended format information in the Data Zone 98

Annex C (normative) Measurement of light reflectivity 101

Annex D (normative) Measurement of birefringence 103

Annex E (normative) Measuring conditions for operation signals 106

Annex F (normative) Measurement of the differential phase tracking error 109

Annex G (normative) The write pulse wave form for testing 113

Annex H (normative) 8-to-16 Modulation 121

Annex I (normative) Optimum Power Control and Recording Conditions 130

Annex J (informative) Running OPC 133

Annex K (informative) Wavelength dependency 134

Annex L (informative) Explanation about the usage of the reference servos 138

Annex M (informative) Measurement of the groove wobble amplitude 145

Annex N (informative) Light fastness of the disk 147

Annex O (informative) Transportation 148

Annex P (informative) Video Content Protection System 149

Annex Q (informative) How to use the Physical format information in ADIP 150

Annex R (informative) Values to be implemented in Existing and Future Specifications 152

Bibliography 155