

INTERNATIONAL STANDARD



Information technology – AT attachment –
Part 103: ATA/ATAPI Command Set - 3 (ACS-3)

(standards.iteh.ai)

[ISO/IEC 17760-103:2021](https://standards.iteh.ai/catalog/standards/sist/940107d9-d71c-42f8-a16e-20929220199b/iso-iec-17760-103-2021)

<https://standards.iteh.ai/catalog/standards/sist/940107d9-d71c-42f8-a16e-20929220199b/iso-iec-17760-103-2021>



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2021 ISO/IEC, Geneva, Switzerland

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 IEC or IEC's member National Committee in the country of the requester. If you have any questions about ISO/IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/IEC 17760-103:2021](https://standards.iteh.ai/catalog/standards/sist/940107d9-d71c-42f8-a16e-20929220199b/iso-iec-17760-103-2021)

<https://standards.iteh.ai/catalog/standards/sist/940107d9-d71c-42f8-a16e-20929220199b/iso-iec-17760-103-2021>



ISO/IEC 17760-103

Edition 1.0 2021-06

INTERNATIONAL STANDARD



Information technology – AT attachment –
Part 103: ATA/ATAPI Command Set - 3 (ACS-3)

STANDARD PREVIEW
(standards.iteh.ai)

ISO/IEC 17760-103:2021
<https://standards.iteh.ai/catalog/standards/sist/940107d9-d71c-42f8-a16e-20929220199b/iso-iec-17760-103-2021>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.200

ISBN 978-2-8322-9827-5

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	16
INTRODUCTION	18
1 Scope	20
2 Normative references	20
3 Terms, definitions, abbreviations, and conventions	21
3.1 Terms and definitions	21
3.2 Symbols and abbreviations.....	30
3.2.1 Abbreviations	30
3.2.2 Units:	31
3.2.3 Mathematical operators:	31
3.2.4 Other Symbols	31
3.3 Conventions.....	31
3.3.1 Overview	31
3.3.2 Precedence	32
3.3.3 Lists	32
3.3.4 Keywords	33
3.3.5 Numbering	34
3.3.6 Bit conventions	35
3.3.7 Number range convention	35
3.3.8 State diagram conventions	35
3.3.9 Byte, word, DWord, QWord, and DQWord Relationships	37
3.3.10 ATA string convention	38
3.3.11 Offset Convention	39
4 Feature set definitions	40
4.1 Overview.....	40
4.1.1 Feature set summary.....	40
4.1.2 Capacity reporting	41
4.2 General feature set	42
4.3 The PACKET feature set	42
4.3.1 Overview	42
4.3.2 Identification of PACKET feature set devices	43
4.3.3 Signature for ATAPI devices	43
4.3.4 The PACKET command	43
4.4 48-bit Address feature set.....	43
4.5 Accessible Max Address Configuration feature set	44
4.5.1 Overview	44
4.5.2 SET ACCESSIBLE MAX ADDRESS EXT description	44
4.5.3 Device Statistics data	44
4.6 Advanced Power Management (APM) feature set	44
4.7 CompactFlash Association (CFA) feature set.....	45
4.8 Device Statistics Notification (DSN) feature set.....	45
4.8.1 Overview	45
4.8.2 DSN notifications	46
4.8.3 DSN notifications setup	46
4.9 Extended Power Conditions (EPC) feature set.....	47
4.9.1 Overview	47
4.9.2 Power conditions	47
4.9.3 Power condition timers	47
4.9.4 Interaction with resets, commands, and other features if the EPC feature set is enabled	48

4.10	Free-fall Control feature set	49
4.11	General Purpose Logging (GPL) feature set	49
4.12	Long Logical Sector (LLS) feature set	50
4.13	Long Physical Sector (LPS) feature set.....	51
4.14	Native Command Queuing (NCQ) feature set	53
4.14.1	Overview	53
4.14.2	Priority	54
4.14.3	Unload with NCQ commands outstanding	54
4.14.4	Command Phases	54
4.15	Power Management feature set.....	55
4.15.1	Overview	55
4.15.2	Power management commands	55
4.15.3	Standby timer	56
4.15.4	Power Management states and transitions	57
4.16	Power-Up In Standby (PUIS) feature set.....	60
4.16.1	Overview	60
4.16.2	Interactions with IDENTIFY DEVICE and IDENTIFY PACKET DEVICE commands	60
4.16.3	PUIS feature set device spin-up subcommand	60
4.17	Sanitize Device feature set	61
4.17.1	Overview	61
4.17.2	Sanitize operation scope	61
4.17.3	Sanitize commands	61
4.17.4	Sanitize operations	61
4.17.5	Command processing during sanitize operations	62
4.17.6	Sanitize Operation Completed Without Error value	62
4.17.7	Failure Mode Policy value	62
4.17.8	Sanitize Antifreeze value	63
4.17.9	Sanitize Device state machine	63
4.18	Security feature set.....	66
4.18.1	Overview	66
4.18.2	Disabling and enabling the Security feature set	66
4.18.3	Passwords	66
4.18.4	Master password capability	67
4.18.5	Frozen mode	67
4.18.6	Commands	67
4.18.7	Security initial setting	67
4.18.8	Password Rules	67
4.18.9	Password attempt counter and SECURITY COUNT EXPIRED bit	68
4.18.10	Master Password Identifier feature	68
4.18.11	Security states	69
4.19	Self-Monitoring, Analysis, and Reporting Technology (SMART) feature set	78
4.19.1	Overview	78
4.19.2	Device SMART data structure	78
4.19.3	Background data collection	78
4.19.4	Off-line/Captive mode data collection	78
4.19.5	Threshold exceeded condition	79
4.19.6	SMART feature set commands	79
4.19.7	SMART operation with power management modes	79
4.19.8	SMART device error log reporting	79
4.20	Sense Data Reporting feature set	79
4.21	Software Settings Preservation (SSP) feature set.....	80
4.22	SATA Hardware Feature Control.....	81
4.23	Streaming feature set	82
4.23.1	Streaming feature set overview	82
4.23.2	Streaming commands	82
4.24	Trusted Computing feature set	83
4.25	Write-Read-Verify feature set	84

5 ATA protocols	85
6 Normal and Error Output field descriptions	86
6.1 Overview	86
6.2 STATUS field	86
6.2.1 Overview	86
6.2.2 ALIGNMENT ERROR bit	86
6.2.3 BUSY bit	87
6.2.4 CHECK CONDITION bit	87
6.2.5 DATA REQUEST bit	87
6.2.6 DEFERRED WRITE ERROR bit	87
6.2.7 DEVICE FAULT bit	87
6.2.8 DEVICE READY bit	87
6.2.9 ERROR bit	87
6.2.10 SENSE DATA AVAILABLE bit	88
6.2.11 STREAM ERROR bit	88
6.2.12 Transport Dependent bits and fields	88
6.3 ERROR field	89
6.3.1 Overview	89
6.3.2 ABORT bit	89
6.3.3 COMMAND COMPLETION TIME OUT bit	89
6.3.4 END OF MEDIA bit	89
6.3.5 ID NOT FOUND bit	89
6.3.6 ILLEGAL LENGTH INDICATOR bit	90
6.3.7 INTERFACE CRC bit	90
6.3.8 SENSE KEY field	90
6.3.9 UNCORRECTABLE ERROR bit	90
6.4 INTERRUPT REASON field	90
6.4.1 Overview	90
6.4.2 COMMAND/DATA bit	90
6.4.3 INPUT/OUTPUT bit	90
6.5 COUNT field	90
6.5.1 Overview	90
6.5.2 Contiguous stream logical sectors that contain potentially bad data	90
6.5.3 NCQ Tag	91
6.6 SACTIVE field	91
6.7 SATA STATUS field	91
6.8 LBA field	91
6.8.1 Overview	91
6.8.2 LBA of First Unrecoverable Error	91
7 Command descriptions	92
7.1 Command description introduction	92
7.1.1 Overview	92
7.1.10 Command Code Usage	96
7.2 Accessible Max Address Configuration	97
7.2.1 Accessible Max Address Configuration overview	97
7.2.2 GET NATIVE MAX ADDRESS EXT – 78h/0000h, Non-Data	97
7.2.3 SET ACCESSIBLE MAX ADDRESS EXT – 78h/0001h, Non-Data	98
7.2.4 FREEZE ACCESSIBLE MAX ADDRESS EXT – 78h/0002h, Non-Data	99
7.3 CHECK POWER MODE – E5h, Non-Data	100
7.4 CONFIGURE STREAM – 51h, Non-Data	101
7.5 DATA SET MANAGEMENT – 06h, DMA	103
7.6 DEVICE RESET – 08h, Device Reset	106
7.7 DOWNLOAD MICROCODE – 92h, PIO Data-Out/Non-Data	107
7.8 DOWNLOAD MICROCODE DMA – 93h, DMA	120
7.9 EXECUTE DEVICE DIAGNOSTIC – 90h, Execute Device Diagnostic	121

7.10	FLUSH CACHE – E7h, Non-Data	123
7.11	FLUSH CACHE EXT – EAh, Non-Data	124
7.12	IDENTIFY DEVICE – ECh, PIO Data-In	125
7.13	IDENTIFY PACKET DEVICE – A1h, PIO Data-In	162
7.14	IDLE – E3h, Non-Data	182
7.15	IDLE IMMEDIATE – E1h, Non-Data	184
7.16	NCQ QUEUE MANAGEMENT – 63h, Non-Data	186
7.16.8	ABORT NCQ QUEUE – 63h/0h, Non-Data.....	188
7.16.9	DEADLINE HANDLING – 63h/1h, Non-Data	191
7.17	NOP – 00h, Non-Data	194
7.18	PACKET – A0h, Packet	195
7.19	READ BUFFER – E4h, PIO Data-In	198
7.20	READ BUFFER DMA – E9h, DMA	199
7.21	READ DMA – C8h, DMA	200
7.22	READ DMA EXT – 25h, DMA	201
7.23	READ FPDMA QUEUED – 60h, DMA Queued	202
7.24	READ LOG EXT – 2Fh, PIO Data-In	204
7.25	READ LOG DMA EXT – 47h, DMA	206
7.26	READ MULTIPLE – C4h, PIO Data-In	207
7.27	READ MULTIPLE EXT – 29h, PIO Data-In	208
7.28	READ SECTOR(S) – 20h, PIO Data-In	209
7.29	READ SECTOR(S) EXT – 24h, PIO Data-In	210
7.30	READ STREAM DMA EXT – 2Ah, DMA	211
7.31	READ STREAM EXT – 2Bh, PIO Data-In	214
7.32	READ VERIFY SECTOR(S) – 40h, Non-Data	215
7.33	READ VERIFY SECTOR(S) EXT – 42h, Non-Data	216
7.34	RECEIVE FPDMA QUEUED – 65h, DMA Queued	217
7.35	REQUEST SENSE DATA EXT – 0Bh, Non-Data	219
7.36	Sanitize Device	220
7.36.2	BLOCK ERASE EXT – B4h/0012h, Non-Data	221
7.36.3	CRYPTO SCRAMBLE EXT – B4h/0011h, Non-Data.....	224
7.36.4	OVERWRITE EXT – B4h/0014h, Non-Data	226
7.36.5	SANITIZE ANTIFREEZE LOCK EXT – B4h/0040h, Non-Data	229
7.36.6	SANITIZE FREEZE LOCK EXT – B4h/0020h, Non-Data	231
7.36.7	SANITIZE STATUS EXT – B4h/0000h, Non-Data	232
7.37	SECURITY DISABLE PASSWORD – F6h, PIO Data-Out	234
7.38	SECURITY ERASE PREPARE – F3h, Non-Data	236
7.39	SECURITY ERASE UNIT – F4h, PIO Data-Out	237
7.40	SECURITY FREEZE LOCK – F5h, Non-Data	239
7.41	SECURITY SET PASSWORD – F1h, PIO Data-Out	240
7.42	SECURITY UNLOCK – F2h, PIO Data-Out	242
7.43	SEND FPDMA QUEUED – 64h, DMA Queued	244
7.43.4	SFQ DATA SET MANAGEMENT – 64h/00h, DMA Queued.....	246
7.44	SET DATE & TIME EXT – 77h, Non-Data	248
7.45	SET FEATURES – EFh, Non-Data	249
7.45.6	SET FEATURES subcommands	250
7.45.7	Enable/disable volatile write cache	252
7.45.8	Set transfer mode	253
7.45.9	Enable/disable the APM feature set	254
7.45.10	Enable/disable the PUIS feature set	254
7.45.11	PUIS feature set device spin-up	254
7.45.12	Enable/Disable Write-Read-Verify feature set	255
7.45.13	Set Maximum Host Interface Sector Times	256
7.45.14	Enable/disable read look-ahead	256
7.45.15	Enable/disable reverting to defaults	256
7.45.16	Enable/Disable the Free-fall Control feature set	257
7.45.17	Enable/Disable SATA feature	257

7.45.18	Enable/Disable the Sense Data Reporting feature set	259
7.45.19	Long Physical Sector Alignment Error Reporting Control	259
7.45.20	Extended Power Conditions subcommand	260
7.45.21	Enable/Disable the DSN feature set	270
7.46	SET MULTIPLE MODE – C6h, Non-Data	271
7.47	SLEEP – E6h, Non-Data	273
7.48	SMART	274
7.48.2	SMART DISABLE OPERATIONS – B0h/D9h, Non-Data	275
7.48.3	SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE – B0h/D2h, Non-Data	276
7.48.4	SMART ENABLE OPERATIONS – B0h/D8h, Non-Data	278
7.48.5	SMART EXECUTE OFF-LINE IMMEDIATE – B0h/D4h, Non-Data	279
7.48.6	SMART READ DATA – B0h/D0h, PIO Data-In	283
7.48.7	SMART READ LOG – B0h/D5h, PIO Data-In	288
7.48.8	SMART RETURN STATUS – B0h/DAh, Non-Data	289
7.48.9	SMART WRITE LOG – B0h/D6h, PIO Data-Out	290
7.49	STANDBY – E2h, Non-Data	291
7.50	STANDBY IMMEDIATE – E0h, Non-Data	292
7.51	TRUSTED NON-DATA – 5Bh, Non-Data	293
7.52	TRUSTED RECEIVE – 5Ch, PIO Data-In	295
7.53	TRUSTED RECEIVE DMA – 5Dh, DMA	302
7.54	TRUSTED SEND – 5Eh, PIO Data-Out	303
7.55	TRUSTED SEND DMA – 5Fh, DMA	305
7.56	WRITE BUFFER – E8h, PIO Data-Out	306
7.57	WRITE BUFFER DMA – EBh, DMA	307
7.58	WRITE DMA – CAh, DMA	308
7.59	WRITE DMA EXT – 35h, DMA	309
7.60	WRITE DMA FUA EXT – 3Dh, DMA	310
7.61	WRITE FPDMA QUEUED – 61h, DMA Queued	311
7.62	WRITE LOG EXT – 3Fh, PIO Data-Out	313
7.63	WRITE LOG DMA EXT – 57h, DMA	315
7.64	WRITE MULTIPLE – C5h, PIO Data-Out	316
7.65	WRITE MULTIPLE EXT – 39h, PIO Data-Out	317
7.66	WRITE MULTIPLE FUA EXT – CEh, PIO Data-Out	319
7.67	WRITE SECTOR(S) – 30h, PIO Data-Out	321
7.68	WRITE SECTOR(S) EXT – 34h, PIO Data-Out	322
7.69	WRITE STREAM DMA EXT – 3Ah, DMA	323
7.70	WRITE STREAM EXT – 3Bh, PIO Data-Out	326
7.71	WRITE UNCORRECTABLE EXT – 45h, Non-Data	327
8	SCT Command Transport	329
8.1	Introduction	329
8.1.1	Overview	329
8.1.2	SCT command interactions with ATA commands	330
8.1.3	Resets	330
8.2	Processing SCT commands	331
8.2.1	Processing SCT commands overview	331
8.2.2	SCT capability identification	331
8.2.3	SCT Command transfer	331
8.2.4	SCT data transfer	336
8.2.5	SCT status	342
8.3	SCT Command Set	348
8.3.1	Overview	348
8.3.2	SCT Write Same command	349
8.3.3	SCT Error Recovery Control command	354
8.3.4	SCT Feature Control command	356
8.3.5	SCT Data Table command	360

9 Normal and Error Outputs	364
9.1 Overview	364
9.2 Normal Outputs	364
9.3 Error Outputs	380
Annex A (normative) Log Definitions	409
A.1 Overview	409
A.2 General Purpose Log Directory (GPL Log Address 00h)	412
A.3 SMART Log Directory (SMART Logging Log Address 00h)	412
A.4 Comprehensive SMART Error log (Log Address 02h)	413
A.5 Device Statistics log (Log Address 04h)	414
A.5.1 Overview	414
A.5.2 List of Supported Device Statistics log pages (log page 00h)	416
A.5.3 Free Fall Statistics (log page 02h)	417
A.5.4 General Statistics (log page 01h)	419
A.5.5 General Errors Statistics (log page 04h)	423
A.5.6 Rotating Media Statistics (log page 03h)	425
A.5.7 Solid State Device Statistics (log page 07h)	430
A.5.8 Temperature Statistics (log page 05h)	431
A.5.9 Transport Statistics (log page 06h)	439
A.5.10 Reserved (log page 08h..FFh)	441
A.6 Device Vendor Specific logs (Log Addresses A0h-DFh)	441
A.7 Extended Comprehensive SMART Error log (Log Address 03h)	441
A.8 Power Conditions log (Log Address 08h)	445
A.8.2 Idle power conditions (log page 00h)	445
A.8.3 Standby power conditions (log page 01h)	446
A.8.4 Power Conditions log descriptor	446
A.9 Extended SMART Self-Test log (Log Address 07h)	449
A.10 Host Specific logs (Log Addresses 80h-9Fh)	451
A.11 IDENTIFY DEVICE data log (Log Address 30h)	452
A.11.1 Overview	452
A.11.2 List of Supported IDENTIFY DEVICE data log pages (Page 00h)	452
A.11.3 Copy of IDENTIFY DEVICE data (page 01h)	453
A.11.4 Capacity (page 02)	453
A.11.5 Supported Capabilities (page 03h)	456
A.11.6 Current Settings (page 04h)	469
A.11.7 Strings (page 05h)	477
A.11.8 Security (page 06h)	478
A.11.9 Parallel ATA (page 07h)	484
A.11.10 Serial ATA (page 08h)	496
A.12 LBA Status log (Log Address 19h)	502
A.12.1 Overview	502
A.12.2 Number of LBA Valid Ranges log page (Page 0000h)	503
A.12.3 LBA Status log pages	503
A.12.4 LBA Status Descriptor	504
A.13 LPS Mis-alignment log (Log Address 0Dh)	505
A.14 NCQ Command Error log (Log Address 10h)	507
A.14.1 Overview	507
A.14.2 NCQ TAG field	507
A.14.3 NQ bit	507
A.14.4 UNL bit	508
A.14.5 Return Fields	508
A.14.6 NCQ Autosense	508
A.14.7 Checksum	508
A.15 Read Stream Error log (Log Address 22h)	509
A.16 SATA Phy Event Counters log (Log Address 11h)	510
A.17 SATA NCQ Queue Management log (Log Address 12h)	512

A.17.1	Overview	512
A.17.2	SUPPORTS ABORT NCQ QUEUE bit	512
A.17.3	SUPPORTS ABORT ALL AT bit	512
A.17.4	SUPPORTS ABORT STREAMING AT bit	512
A.17.5	SUPPORTS ABORT NON-STREAMING AT bit	513
A.17.6	SUPPORTS ABORT SELECTED TTAG AT bit	513
A.17.7	SUPPORTS DEADLINE HANDLING bit	513
A.17.8	SUPPORTS WDNC bit	513
A.17.9	SUPPORTS RDNC bit	513
A.18	SATA NCQ Send and Receive log (Log Address 13h)	514
A.18.1	Overview	514
A.18.2	SFQ DATA SET MANAGEMENT SUPPORTED bit	514
A.18.3	SFQ DATA SET MANAGEMENT SUPPORTS TRIM bit	514
A.19	Selective Self-Test log (Log Address 09h)	515
A.20	SMART Self-Test log (Log Address 06h)	517
A.21	Summary SMART Error log (Log Address 01h)	518
A.22	Write Stream Error log (Log Address 21h)	521
A.23	Current Device Internal Status Data log (Log Address 24h)	522
A.23.1	Overview	522
A.23.2	Current Device Internal Status Data header page	523
A.23.3	Current Device Internal Status data pages	525
A.23.4	Examples of data area usage	525
A.24	Saved Device Internal Status Data log (Log Address 25h)	527
A.24.1	Overview	527
A.24.2	Saved Device Internal Status Data header page	527
A.24.3	Current Device Internal Status data pages	528
A.25	Device Statistics Notifications log (Log Address 0Ah)	528
Annex B (informative)	Command Set Summary	532
Annex C (informative)	How to Use SCT Commands	559
C.1	How to Use SCT Commands Overview	559
C.2	Examples of Log Page Command Sequences	561
C.3	Issuing an SCT Command to a Device	566
C.3.1	Step 1 – Build a Key Page	566
C.3.2	Step 2 – Issue the SCT command	567
C.3.3	Step 3 – Transfer Data if Required	568
C.3.4	Step 4 – Final Status/SCT Command Completion	569
Annex D (informative)	Implementation Guidelines for 1 024- and 4 096-Byte Sector Sizes	570
D.1	General	570
D.2	Overview	570
D.3	Implementation	572
D.3.1	4 096-Byte Physical Sector Size Implementation	572
D.3.2	Reporting Alignment (512-Byte LBA Only)	572
D.3.3	RMW operations (512-Byte LBA Only)	573
D.4	Implementation Issues (512-Byte LBA Only)	573
D.4.1	Overview	573
D.4.2	Drive Partitioning	574
D.4.3	File System Formatting	575
D.4.4	Virtual Memory accessing	575
D.4.5	Bootting	575
Bibliography	576

iTech STANDARD PREVIEW
(standards.itech.ai)

Numbering conventions 34
ATA string byte swapping 39
FIRMWARE REVISION field example 39
Feature set summary 40
IDENTIFY DEVICE capacity reporting 41
Words Transferred Per COUNT Field Unit by Command 50
PRIO field 54
Summary of Security States and Security Characteristics 69
Security Command Actions 70
Security page settings for the SEC1: Security Disabled/Not Locked/Not Frozen state 74
Security page settings for the SEC2: Security Disabled/Not Locked/Frozen state 75
Security page settings for the SEC4: Security Enabled/Locked/Not Frozen state 76
Security page settings for the SEC5: Security Enabled/Not Locked/Not Frozen state 77
Security page settings for the SEC6: Security Enabled/Not Locked/Frozen state 78
Preserved Feature Sets and Settings 81
STATUS field 86
ERROR field 89
INTERRUPT REASON field 90
COUNT field use for NCQ Tag 91
Example Command Structure 93
Example Normal Output 94
Example Error Output 95
Command Code Usage Matrix 96
Accessible Max Address Configuration FEATURE field values 97
GET NATIVE MAX ADDRESS EXT command inputs 97
SET ACCESSIBLE MAX ADDRESS EXT command inputs 98
FREEZE ACCESSIBLE MAX ADDRESS EXT command inputs 99
CHECK POWER MODE command inputs 100
CONFIGURE STREAM command inputs 101
DATA SET MANAGEMENT command inputs 103
Trim related interactions 104
LBA Range Entries 105
DEVICE RESET command inputs 106
DOWNLOAD MICROCODE SUBCOMMAND field 108
DOWNLOAD MICROCODE command inputs 118
COUNT field output for DOWNLOAD MICROCODE requesting the offset transfer method 119
DOWNLOAD MICROCODE DMA command inputs 120
EXECUTE DEVICE DIAGNOSTIC command inputs 121
Diagnostic codes 122
FLUSH CACHE command inputs 123
FLUSH CACHE EXT command inputs 124
IDENTIFY DEVICE command inputs 125
IDENTIFY DEVICE data 126
Specific configuration 146
Minor version number 151
Transport minor version number 161
IDENTIFY PACKET DEVICE command inputs 162
IDENTIFY PACKET DEVICE data 163
IDLE command inputs 182
Standby timer periods 182
IDLE IMMEDIATE command inputs 184
IDLE IMMEDIATE with Unload feature command inputs 185
NCQ QUEUE MANAGEMENT command inputs 186
NCQ QUEUE MANAGEMENT Subcommands 187
ABORT NCQ QUEUE command inputs 189
ABORT NCQ QUEUE Abort Types 190
DEADLINE HANDLING command inputs 192

NOP command inputs 194
 NOP Subcommand Code 194
 PACKET command inputs 195
 READ BUFFER command inputs 198
 READ BUFFER DMA command inputs 199
 READ DMA command inputs 200
 READ DMA EXT command inputs 201
 READ FPDMA QUEUED command inputs 202
 READ LOG EXT command inputs 204
 READ LOG DMA EXT command inputs 206
 READ MULTIPLE command inputs 207
 READ MULTIPLE EXT command inputs 208
 READ SECTOR(S) command inputs 209
 READ SECTOR(S) EXT command inputs 210
 READ STREAM DMA EXT command inputs 211
 READ STREAM EXT command inputs 214
 READ VERIFY SECTOR(S) command inputs 215
 READ VERIFY SECTOR(S) EXT command inputs 216
 RECEIVE FPDMA QUEUED command inputs 217
 RECEIVE FPDMA QUEUED Subcommands 217
 REQUEST SENSE DATA EXT command inputs 219
 Sanitize Device FEATURE field values 220
 BLOCK ERASE EXT command inputs 222
 CRYPTO SCRAMBLE EXT command inputs 224
 OVERWRITE EXT command inputs 227
 SANITIZE ANTIFREEZE LOCK EXT command inputs 229
 SANITIZE FREEZE LOCK EXT command inputs 231
 SANITIZE STATUS EXT command inputs 232
 SECURITY DISABLE PASSWORD command inputs 234
 SECURITY DISABLE PASSWORD data content 235
 SECURITY ERASE PREPARE command inputs 236
 Erase Mode characteristics 237
 SECURITY ERASE UNIT command inputs 238
 SECURITY ERASE UNIT data content 238
 SECURITY FREEZE LOCK command inputs 239
 SECURITY SET PASSWORD command inputs 241
 SECURITY SET PASSWORD data content 241
 SECURITY UNLOCK command inputs 243
 SECURITY UNLOCK data content 243
 SEND FPDMA QUEUED command inputs 244
 SEND FPDMA QUEUED Subcommands 244
 SFQ DATA SET MANAGEMENT command inputs 246
 SET DATE & TIME EXT command inputs 248
 SET FEATURES command inputs 249
 SET FEATURES command subcommand codes 250
 Transfer modes 253
 APM levels 254
 Write-Read-Verify modes 255
 Maximum Host Interface Sector Times 256
 SATA features 257
 Hardware Feature Control Reset Responses 258
 EPC subcommands 260
 POWER CONDITION ID field 260
 Restore Power Condition Settings inputs 261
 Go To Power Condition inputs 262
 Set Power Condition Timer inputs 264
 Set Power Condition State inputs 266

Enable the EPC feature set inputs 267
Disable the EPC feature set inputs 268
Set EPC Power Source inputs 269
DSN feature set subcommands 270
SET MULTIPLE MODE command inputs 272
SLEEP command inputs 273
FEATURE field values 274
SMART DISABLE OPERATIONS command inputs 275
SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE command inputs 276
SMART ENABLE OPERATIONS command inputs 278
SMART EXECUTE OFF-LINE IMMEDIATE Subcommands 279
SMART EXECUTE OFF-LINE IMMEDIATE command inputs 282
SMART READ DATA command inputs 283
Device SMART data structure 284
Off-line data collection status byte values 285
Self-test execution status values 286
Offline Data Collection Capabilities 286
SMART READ LOG command inputs 288
SMART RETURN STATUS command inputs 289
SMART WRITE LOG command inputs 290
STANDBY command inputs 291
STANDBY IMMEDIATE command inputs 292
TRUSTED NON-DATA command inputs 293
TRUSTED RECEIVE command inputs 296
TRUSTED RECEIVE SECURITY PROTOCOL field 296
Security Protocol 00h SP SPECIFIC field 297
TRUSTED RECEIVE parameter data for SP Specific=0000h 298
TRUSTED RECEIVE parameter data for SP Specific=0001h 299
TRUSTED RECEIVE parameter data for SP Specific=0002h 300
Compliance Descriptor Type 300
Compliance Descriptor Header 300
Security Requirements for Cryptographic Modules descriptor 301
TRUSTED RECEIVE DMA command inputs 302
TRUSTED SEND command inputs 303
TRUSTED SEND – SECURITY PROTOCOL field 304
TRUSTED SEND DMA command inputs 305
WRITE BUFFER command inputs 306
WRITE BUFFER DMA command inputs 307
WRITE DMA command inputs 308
WRITE DMA EXT command inputs 309
WRITE DMA FUA EXT command inputs 310
WRITE FPDMA QUEUED command inputs 311
WRITE LOG EXT command inputs 313
WRITE LOG DMA EXT command inputs 315
WRITE MULTIPLE command inputs 316
WRITE MULTIPLE EXT command inputs 317
WRITE MULTIPLE FUA EXT command inputs 319
WRITE SECTOR(S) command inputs 321
WRITE SECTOR(S) EXT command inputs 322
WRITE STREAM DMA EXT command inputs 323
WRITE STREAM EXT command inputs 326
WRITE UNCORRECTABLE EXT command inputs 328
Summary of SCT Command Transport logs 329
Summary of ATA commands used by the SCT Command Transport 329
Fields to send an SCT Command using SMART WRITE LOG 331
Fields to send an SCT Command using GPL write logs 332
Successful SCT Command response 333

SCT Command error response 334
EXTENDED STATUS CODE field 335
SCT data transfer using the SMART feature set 336
SCT data transfer using the GPL feature set 337
Successful SMART SCT data transfer response 338
Successful GPL SCT data transfer response 339
SMART SCT data transfer error response 340
GPL SCT data transfer error response 341
SCT status request using the SMART feature set 342
SCT status request using the GPL feature set 343
Successful SMART SCT status response 344
Successful GPL SCT status response 345
Format of SCT status response 346
SMART and GPL SCT status error response 347
SCT command basic key page structure 348
ACTION CODE field 348
SCT Write Same command key page 352
SCT Write Same command status response 353
SCT Error Recovery Control command 354
SCT Error Recovery Control command status response 355
SCT Feature Control command key page 356
Feature Code list 357
Options Flags for each Feature Code 358
SCT Feature Control command status response 359
SCT Data Table command 360
TABLE ID field 360
HDA Temperature History table 361
SCT Data Table command status response 363
Generic Normal Output (No LBA Return Value) for Normal Output 364
Download Microcode Normal Output 365
Check Power Mode Normal Output 366
Stream Normal Output 368
Device Signatures for Normal Output 369
IDLE Unload Normal Output 370
ATAPI Normal Output 371
SMART Off-Line Immediate Normal Output 372
SMART Return Status Normal Output 373
Generic Extended Normal Output 374
NCQ Command Acceptance Normal Output 375
NCQ Normal Output 376
REQUEST SENSE DATA EXT Normal Output 377
GET NATIVE MAX ADDRESS EXT Normal Output 378
Sanitize Device Normal Output 379
Unsupported Command Error 381
Check Power Mode Abort Error 382
Generic Abort wo/ICRC Error 383
Generic Abort Error 384
Trusted Abort Error 385
Configure Stream Error 386
Flush Cache Error 387
Flush Cache Ext Error 388
Read DMA Ext Error 389
Read Log Ext Error 390
Read PIO Error 391
Read Stream Error 392
Write Log Error 393
Write Log Ext Error or Data Set Management Error 394

SMART Error 395
Write Extended Error 396
Write Stream Error 397
NOP Error 398
PACKET command Error 399
SMART Read Log/SMART Read Data Error 400
Read PIO Extended Error 401
SET ACCESSIBLE MAX ADDRESS EXT Error 402
Write Error 403
Write DMA Error 404
NCQ Command Acceptance Error 405
NCQ Write Command Aborted Error 406
NCQ Read Command Aborted Error 407
Sanitize Device Error 408
Example Log Structure 409
Log address definition 410
General Purpose Log Directory 412
SMART Log Directory 412
Comprehensive SMART Error log 413
Defined Device Statistics log pages 414
Device Statistic format 415
DEVICE STATISTIC FLAGS field 415
List of supported Device Statistics log pages 417
Free Fall Statistics 418
General Statistics 419
General Error Statistics 424
Rotating Media Statistics 425
Solid State Device Statistics 430
Temperature Statistics 431
Transport Statistics 439
Extended Comprehensive SMART Error log 441
Extended Error log data structure 442
Command data structure 443
Error data structure 444
State field values 444
Idle Power Conditions log page 445
Standby Power Conditions log page 446
Power Conditions log descriptor 446
Extended Self-test log data structure 450
Extended Self-test log descriptor entry 451
Defined IDENTIFY DEVICE data pages 452
List of supported IDENTIFY DEVICE data pages 452
Capacity 453
Supported Capabilities 456
Nominal Media Rotation Rate 466
NOMINAL FORM FACTOR field 467
World wide name format (word-based view) 468
IDENTIFY DEVICE data WWN format (word-based view) 468
IDENTIFY DEVICE data WWN format (byte-based view) 469
Current Settings 469
POWER SOURCE field 473
Strings 477
Security 478
Short format ENHANCED SECURITY ERASE TIME field 481
Extended format ENHANCED SECURITY ERASE TIME field 481
Short format NORMAL SECURITY ERASE TIME field 482
Extended format NORMAL SECURITY ERASE TIME field 482

STANDARD PREVIEW
(standards.iteh.ai)

[ISO/IEC 17760-103:2021](https://standards.iteh.ai/catalog/standards/sist/940107d9-d71c-42f8-a16e-20929220199b/iso-iec-17760-103-2021)

<https://standards.iteh.ai/catalog/standards/sist/940107d9-d71c-42f8-a16e-20929220199b/iso-iec-17760-103-2021>