RealSSD™ P200 2.5-Inch SATA NAND Flash SSD

MTFDBACxxxSAE

Features

- Micron® SLC NAND Flash
- RoHS-compliant package
- Compatibility
  - Interface: SATA 3 Gb/s
  - ATA modes supported
    PIO mode 3, 4
    MultiWord DMA mode 0, 1, 2
    Ultra DMA mode 0, 1, 2, 3, 4, 5, 6
  - Industry-standard 512 byte sector size support
  - Hot-plug capable
  - Native command queueing support with 32-command slot support
  - ATA-7 command set compliant
  - ATA security feature command set and password login support
  - Secure erase (data page) command set
    Fast and Secure erase (clear, sanitize)
  - Self-monitoring, analysis, and reporting technology (SMART) command set
- Performance[1, 2]
  - Sequential READ
    Up to 180 MB/s
  - Sequential WRITE
    Up to 115 MB/s
  - READ latency
    210µs (TYP)
  - WRITE Latency
    280µs (TYP)
- Reliability
  - MTBF (mean time between failures): 1 million device hours
  - Endurance: total bytes written (TBW) per drive density
    - 25GB: 365TB
    - 50GB: 730TB
    - 100GB: 1460TB
  - 3 year warranty
  - Static and dynamic wear leveling
  - Field-upgradable firmware
  - Bit error rate: <1 sector per 10^{15} bits read
  - Low power consumption (<2.2W active)
- Mechanical
  - Standard SATA connector
    Voltage: 5V ±5%
  - Form factor: 2.5-inch drive package
    (100.45mm x 69.85mm x 9.5mm)
  - Weight: 77g (MAX)

Options

- Capacity[3] (unformatted)
  - 25GB
  - 50GB
  - 100GB
- Operating temperature
  - Industrial (–40°C to +85°C)
  - Commercial (0°C to +70°C)

Notes: 1. Typical I/O performance numbers as measured using Iometer with a queue depth of 32 and write cache enabled.
2. 4K transfers used for READ/WRITE latency values.
3. 1GB = 1 billion bytes; formatted capacity is less.

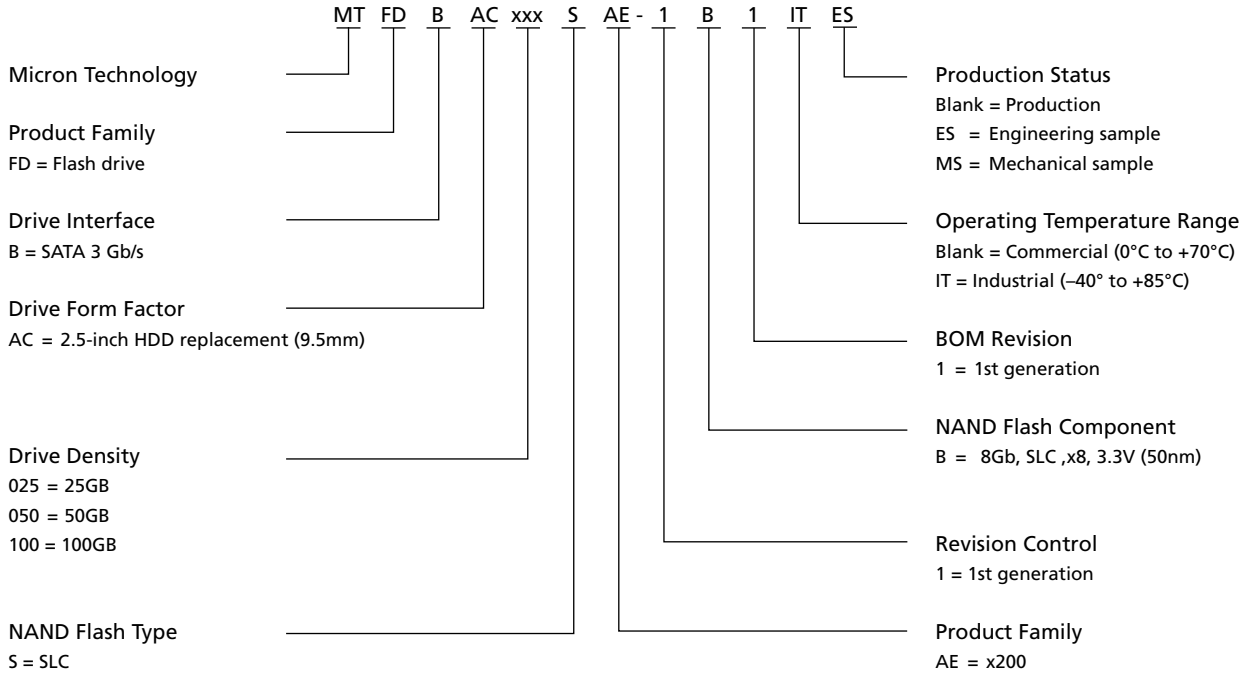
Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.
Products and specifications discussed herein are subject to change by Micron without notice.

Downloaded from Elcodis.com electronic components distributor

Part Numbering Information

Micron's P200 SSD is available in different configurations and densities. Visit www.micron.com for a list of valid part numbers.

Figure 1: Part Number Chart



Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

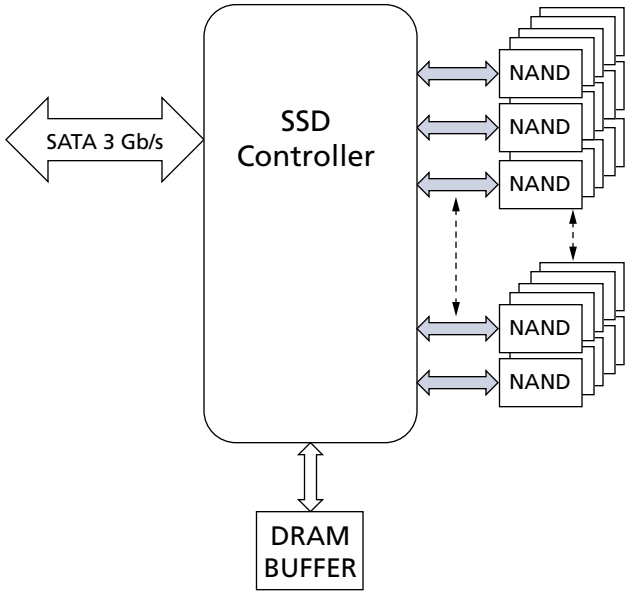
Downloaded from Elcodis.com electronic components distributor

General Description

Micron's Real*SSD* solid state drive (SSD) uses a single-chip controller with a SATA 3 Gb/sec interface on the system side and n-channels of Micron NAND Flash internally. Packaged in an HDD replacement enclosure, the SSD integrates easily in existing storage infrastructures.

The P200 is designed to use the SATA interface efficiently during both READs and WRITEs while delivering IOP focused performance. SSD technology enables enhanced boot times, faster application load times, reduced power consumption, and extended reliability.

Figure 2: Functional Block Diagram



Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Architecture

The 200-series SSD is a NAND Flash storage device. A SATA 3 Gb/s interface connects to the SSD externally and communicates with the controller. The controller manages data transfer to and from the NAND Flash array.

Table 1: P200 Configuration

Unformatted Disk Density	NAND Flash Process	NAND Flash Density	TSOP Package Count	Die per TSOP Package
25GB	50nm	8Gb	16	2
	34nm	16Gb	16	1
50GB	50nm	8Gb	16	4
	34nm	16Gb	16	2
100GB	34nm	16Gb	16	4

Logical Block Address Configuration

The drive is set to report the number of logical block addresses (LBA) that will ensure sufficient storage space for the specified density. Standard LBA settings based off of the IDEMA standard, LBA1-02, are shown below.

Table 2: Standard LBA Settings

Drive Size[1]	Total LBAs		Max LBA		User Available Bytes
	Decimal	Hexadecimal	Decimal	Hexadecimal	(unformatted)
25GB	48,858,768	2E98690	48,858,767	2E9868F	25,0156,89,216
50GB	97,696,368	5D2BA70	97,696,367	5D2BA6F	50,020,540,416
100GB	195,371,568	BA52230	195,371,567	BA5222F	100,030,242,816

Notes: 1. 1GB = 1,000,000,000 bytes.

Table 3: 2.5-Inch Nominal Dimensions and Weight

	Value	Unit
Height	9.5	mm
Width	69.85	mm
Length	100.45	mm
Maximum unit weight	77	g

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Interface Connectors

The SATA signal segment interface cable has four conductors and three ground connections. As shown in Figure 3, the cable includes a 7-pin signal segment and a 15-pin power segment arranged in a single row with a 1.27mm (0.050in) pitch.

Table 4: Serial ATA Signal Segment Pin Assignments

Signal Name	Type	Description
S1	GND	Ground
S2	A	Differential signal pair A and A#
S3	A#	
S4	GND	Ground
S5	B#	Differential signal pair B and B#
S6	B	
S7	GND	Ground

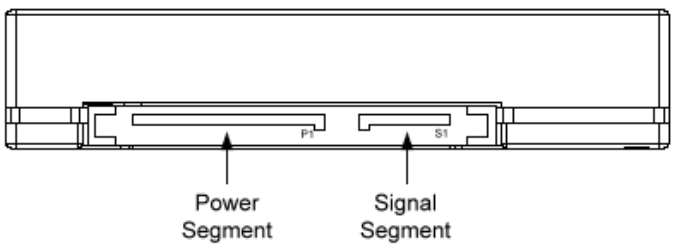
Note: All pins are in a single row with a 1.27mm (0.050in) pitch.

Table 5: 2.5-Inch SATA Power Segment Pin Assignments

Pin#	Signal Name	Description
P1	V33	No connect
P2	V33	No connect
P3	V33	No connect
P4	GND	Ground
P5	GND	Ground
P6	GND	Ground
P7	V5	5V power, precharge
P8	V5	5V power
P9	V5	5V power
P10	GND	Ground
P11	DAS[1]	Device Activity Signal
P12	GND	Ground
P13	V12	No connect
P14	V12	No connect
P15	V12	No connect

Note: 1. The DAS signal may be optionally connected to GND if an LED is not being used.

Figure 3: Interface Connections



Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Device ID

Table 6: IDENTIFY Device ID

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
0	15	F	0b	0 = ATA device
	14-8	X	X	Retired
	7	F	0b	0 = Non-removable media device
	6-3	X	X	Don't Care
	2	V	0/1b	1 = IDENTIFY DEVICE data incomplete
	1	X	X	Retired
	0	F	0b	Reserved
1	15-0	X	X	Number of logical cylinders (obsolete)
2	15-0	V	X	Specific configuration (obsolete)
3	15-0	X	X	Number of logical heads (obsolete)
4-5	31-0	X	X	Number of logical sectors per logical track (obsolete)
6	15-0	X	X	Reserved
7-8	31-0	V	X	Reserved
9	15-0	X	X	Retired
10-19	159-0	F	Varies	Serial number (20 ASCII characters)
20-22	47-0	X	X	Don't Care
23-26	63-0	F	Varies	Firmware revision (8 ASCII characters)
27-46	319-0	F	Varies	Model number (40 ASCII characters)
47	15-8	F	80h	80h
	7-0	F	10h	00h = Reserved 01h-FFh = Number of sectors transfered per interrupt on R/W MULTIPLE cmds
48	15-0	F	0h	Reserved
49	15-14	R	00b	Reserved for IDENTIFY PACKET DEVICE cmd
	13	F	1b	1 = Standby timer values as specified in ATA/ATAPI - 7 support 0 = Standby timer values shall be managed by the device
	12	R	0b	Reserved for IDENTIFY PACKET DEVICE cmd
	11	F	1b	1 = IORDY support 0 = IORDY may be supported
	10	F	1b	1 = IORDY may be disabled
	9	F	1b	1 = LBA support
	8	F	1b	1 = DMA support
	7-0	X	X	Retired
50	15	F	0b	Shall be cleared to 0
	14	F	1b	Don't Care (set to 1)
	13-2	F	0h	Reserved
	1	X	X	Obsolete
	0	F	0b	1 = Device specific standby timer min value
51-52	31-0	X	X	Obsolete

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 6: IDENTIFY Device ID (Continued)

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
53	15-3	R	0h	Reserved
	2	F	1b	1 = The fields reported in word 88 are valid 0 = The fields reported in word 88 are not valid
	1	F	1b	1 = The fields reported in words (70:64) are valid 0 = The fields reported in words (70:64) are not valid
	0	X	X	Obsolete
54	15-0	X	X	Number of current cylinders (obsolete)
55	15-0	X	X	Number of current heads (obsolete)
56	15-0	X	X	Numer of current sectors per track (obsolete)
57-58	31-0	X	X	Current capacity in sectors (obsolete
59	15-9	F	0h	Reserved
	8	V	X	1 = Multiple sector setting is valid (Don't Care)
	7-0	V	X	xxh = Current setting for number of sectors per interrupt on R/W MULTIPLE cmds
60-61	31-0	F	Sect	Total number of user addressable sectors (28-bit address)
62	15-0	X	X	Obsolete
63	15-11	F	0h	Reserved
	10	V	0/1b	1 = Multiword DMA mode 2 is selected 0 = Multiword DMA mode 2 is not selected
	9	V	0/1b	1 = Multiword DMA mode 1 is selected 0 = Multiword DMA mode 1 is not selected
	8	V	0/1b	1 = Multiword DMA mode 0 is selected 0 = Multiword DMA mode 0 is not selected
	7-3	F	0h	Reserved
	2	F	1b	1 = Multiword DMA mode 2 and below is supported
	1	F	1b	1 = Multiword DMA mode 1 and below is supported
	0	F	1b	1 = Multiword DMA mode 0 is supported
64	15-2	F	0h	Reserved
	1-0	F	3h	PIO modes support
65	15-0	F	78h	Minimum multiword DMA transfer cycle time per word in nanoseconds
66	15-0	F	78h	MFR recommended multiword DMA transfer cycle time per word in nanoseconds
67	15-0	F	78h	Minimum PIO transfer cycle time without IORDY flow control
68	15-0	F	78h	Minimum PIO transfer cycle time with IORDY flow control
69-74	95-0	F	0h	Reserved
75	15-5	F	0h	Reserved
	4-0	F	1Fh	1Fh = NCQ device (1Fh = 32 - 1 (maximum queue depth support))

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 6: IDENTIFY Device ID (Continued)

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
76	15-13	F	0h	Reserved
	12	F	0b	1 = Supports NCQ priority information
	11	F	0b	1 = Supports unload while NCQ commands outstanding
	10	F	0b	1 = Supports phy event counters
	9	F	0b	1 = Supports receipt of host-initiated power management requests (HIPM)
	8	F	1b	1 = Supports native command queuing (NCQ)
	7-3	F	0h	Reserved
	2	F	1b	1 = Supports Serial ATA Gen-2 signaling speed (3 Gb/s)
	1	F	1b	1 = Supports Serial ATA Gen-1 signaling speed (1.5Gb/s)
	0	F	0b	Reserved
77	15-0	F	0h	Reserved
78	15-7	F	0h	Reserved
	6	F	1b	1 = Supports software settings preservation
	5	F	0b	Reserved
	4	F	0b	1 = Supports in-order data delivery
	3	F	1b	1 = Device supports initiating interface power management (DIPM)
	2	F	0b	1 = Supports DMA Setup auto-activate optimization
	1	F	0b	1 = Supports nonzero buffer offsets in DMA Setup FIS
	0	F	0b	Reserved
79	15-7	F	0h	Reserved
	6	V	1b	1 = Software settings preservation enabled
	5	F	0b	Reserved
	4	V	0b	1 = In-order data delivery enabled
	3	V	0b	1 = Device initiating interface power management enabled
	2	V	0b	1 = DMA setup auto-activate optimization enabled
	1	V	0b	1 = Nonzero buffer offsets in DMA setup FIS enabled
	0	F	0b	Reserved
80	15-9	F	0h	Major version number reserved (future revisions)
	8	F	0b	Reserved for ATA/ATAPI-8 major version number
	7	F	1b	1 = Supports ATA/ATAPI-7 major version number
	6	F	1b	1 = Supports ATA/ATAPI-6 major version number
	5	F	1b	1 = Supports ATA/ATAPI-5 major version number
	4	F	1b	1 = Supports ATA/ATAPI-4 major version number
	3-1	X	X	Obsolete
	0	F	0b	Reserved
81	15-0	F	21h	Minor version number

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 6: IDENTIFY Device ID (Continued)

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
82	15	X	X	Obsolete
	14	F	1b	1 = NOP command support
	13	F	1b	1 = READ BUFFER command support
	12	F	1b	1 = WRITE BUFFER command support
	11	X	X	Obsolete
	10	F	1b	1 = Host-protected area feature set support
	9	F	0b	1 = DEVICE RESET command support (ATAPI packet command)
	8	F	0b	1 = Service interrupt support
	7	F	0b	1 = Release interrupt support
	6	F	1b	1 = Look-ahead support
	5	F	1b	1 = Write cache support
	4	F	0b	1 = Packet command feature set support
	3	F	1b	1 = Mandatory Power management feature set support
	2	F	0b	1 = Removable media feature set support
	1	F	1b	1 = Security mode feature set support
	0	F	1b	1 = SMART feature set support
83	15	F	0b	Shall be cleared to 0
	14	F	1b	Shall be set to 1
	13	F	1b	1 = FLUSH CACHE EXT command support
	12	F	1b	1 = Mandatory FLUSH CACHE command support
	11	F	1b	1 = Device configuration overlay feature set support
	10	F	1b	1 = 48-bit address feature set support
	9	F	0b	1 = Automatic acoustic management feature set support
	8	F	1b	1 = SET MAX security extension support
	7	F	0b	1 = Address offset reserved area boot mode support
	6	F	X	1 = SET FEATURES subcommand required by HDD will be non-op to an SSD
	5	F	1b	1 = Power-up in standby feature set support
	4	F	0b	1 = Removable media status notification feature set support
	3	F	X	1 = Advanced power management feature set support
	2	F	0b	1 = CFA feature set support
	1	F	0b	1 = READ/WRITE DMA QUEUED support
	0	F	1b	1 = DOWNLOAD MICROCODE command support

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 6: IDENTIFY Device ID (Continued)

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
84	15	F	0b	Shall be cleared to 0
	14	F	1b	Shall be set to 1
	13	F	0b	1 = IDLE IMMEDIATE with UNLOAD FEATURE support
	12	F	X	Reserved for technical report INCITS TR-37-2004 (TLC)
	11	F	X	Reserved for technical report INCITS TR-37-2004 (TLC)
	10	F	0b	1 = URG bit support for WRITE STREAM DMA EXT and WRITE STREAM EXT
	9	F	0b	1 = URG bit support for READ STREAM DMA EXT and READ STREAM EXT
	8	F	X	1 = 64-bit world wide name support
	7	F	0b	1 = WRITE DMA QUEUED FUA EXT command support
	6	F	1b	1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands support
	5	F	1b	1 = General purpose logging feature set support
	4	F	0b	1 = Streaming feature set support
	3	F	0b	1 = Media card passthrough command feature set support
	2	F	0b	1 = Media serial number support
	1	F	1b	1 = SMART self-test support
	0	F	1b	1 = SMART error logging support
85	15	X	X	Obsolete
	14	F	1b	1 = NOP command enabled
	13	F	1b	1 = READ BUFFER command enabled
	12	F	1b	1 = WRITE BUFFER command enabled
	11	X	X	Obsolete
	10	V	1b	1 = Host-protected area feature set enabled
	9	F	0b	1 = DEVICE RESET command enabled (ATAPI packet command)
	8	V	0b	1 = SERVICE interrupt enabled
	7	V	0b	1 = release interrupt enabled
	6	V	1b	1 = look-ahead enabled
	5	V	1b	1 = write cache enabled
	4	F	0b	1 = Packet command feature set enabled
	3	F	1b	1 = Power management feature set enabled
	2	F	0b	1 = Removable media feature set enabled
	1	V	0b	1 = Security mode feature set enabled
	0	V	1b	1 = SMART feature set enabled

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 6: IDENTIFY Device ID (Continued)

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
86	15	F	1b	1 = Words 120 and 119 are valid
	14	F	0b	Reserved
	13	F	1b	1 = FLUSH CACHE EXT command supported
	12	F	1b	1 = Mandatory FLUSH CACHE command support
	11	F	1b	1 = Device configuration overlay feature set support
	10	F	1b	1 = 48-bit address feature set support
	9	V	0b	1 = Automatic acoustic management feature set enabled
	8	F	0b	1 = SET MAX security extension enabled by SET MAX SET PASSWORD
	7	F	0b	1 = Address offset reserved area boot mode active
	6	F	X	1 = SET FEATURES subcommand required on HDD and is Non-Op for an SSD
	5	V	0b	1 = Power-up in standby feature set enabled
	4	V	0b	1 = Removable media status notification feature set enabled
	3	V	0b	1 = Advanced power management feature set enabled
	2	F	0b	1 = CFA feature set enabled
	1	F	0b	1 = READ/WRITE DMA QUEUED support
	0	F	1b	1 = DOWNLOAD MICROCODE command support
87	15	F	0b	Shall be cleared to 0
	14	F	1b	Shall be set to 1
	13	F	0b	1 = IDLE IMMEDIATE with UNLOAD FEATURE support (default)
	12	F	X	Reserved for technical report INCITS TR-37-2004 (TLC)
	11	F	X	Reserved for technical report INCITS TR-37-2004 (TLC)
	10	F	0b	1 = URG bit for WRITE STREAM DMA EXT & WRITE STREAM EXT (sup. Dflt.)
	9	F	0b	1 = URG bit for READ STREAM DMA EXT & READ STREAM EXT (sup. Dflt.)
	8	F	X	1 = 64-bit world wide name support (default)
	7	F	0b	1 = WRITE DMA QUEUED FUA EXT command support (default)
	6	F	1b	1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT cmds support (default)
	5	F	1b	1 = General purpose logging feature set support (default)
	4	V	0b	1 = Streaming feature set support (default)
	3	V	0b	1 = Media card passthrough command feature set support (default)
	2	V	0b	1 = Media serial number support (default)
	1	F	1b	1 = SMART self-test support (default)
	0	F	1b	1 = SMART error logging support (default)

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 6: IDENTIFY Device ID (Continued)

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
88	15	F	0b	Reserved
	14	F	0b	Reserved
	13	V	0/1b	1 = Ultra DMA mode 5 is selected 0 = Ultra DMA mode 5 is not selected
	12	V	0/1b	1 = Ultra DMA mode 4 is selected 0 = Ultra DMA mode 4 is not selected
	11	V	0/1b	1 = Ultra DMA mode 3 is selected 0 = Ultra DMA mode 3 is not selected
	10	V	0/1b	1 = Ultra DMA mode 2 is selected 0 = Ultra DMA mode 2 is not selected
	9	V	0/1b	1 = Ultra DMA mode 1 is selected 0 = Ultra DMA mode 1 is not selected
	8	V	0/1b	1 = Ultra DMA mode 0 is selected 0 = Ultra DMA mode 0 is not selected
	7	F	0b	Reserved
	6	F	X	1 = Ultra DMA mode 6 and below supported
	5	F	1b	1 = Ultra DMA mode 5 and below supported
	4	F	1b	1 = Ultra DMA mode 4 and below supported
	3	F	1b	1 = Ultra DMA mode 3 and below supported
	2	F	1b	1 = Ultra DMA mode 2 and below supported
	1	F	1b	1 = Ultra DMA mode 1 and below supported
	0	F	1b	1 = Ultra DMA mode 0 support
89	15-0	F	5h	Time required; Security erase unit complete
90	15-0	F	5h	Time required; Enhanced security erase complete
91	15-0	V	0h	Current advanced power management value
92	15-0	V	0h or FFFFh	Master password revision code
93	15-0	V	0h	Cleared to 0s if Serial ATA
94	15-8	V	X	Vendor's recommended acoustic management value
	7-0	V	0h	Current auto acoustic management value
95-99	79-0	F	X	Reserved
100-103	63-0	V	LBA	Maximum user LBA for 48-bit address feature set
104-126	367-0	F	X	Reserved
127	15-0	F	0h	Removable media bits
128	15-9	F	X	Security status bits
	8	V	X	1 = Security mode enabled
	7-6	R	X	Security status bits
	5	V	0b	1 = Enhanced security erase unit support
	4	V	X	1 = Security count is expired
	3	V	X	1 = Security frozen
	2	V	X	1 = Security locked
	1	V	X	1 = Security enabled
	0	F	1h	1 = Security supported

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 6: IDENTIFY Device ID (Continued)

F = The content of the word is fixed and does not change
V = The content of the word is variable and may change depending on the state of the device or the commands excuted by the device
X = The content of the word may be fixed or variable
R = The content of the word is reserved and shall be zero

Word	Bit(s)	Setting	Default Value	Description
129-254	2015-0	F	X	Reserved
255	15-8	X	X	Checksum
	7-0	X	A5h	A5h = signature for ATA device

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Commands

Table 7: Supported ATA Command Set
See ATA-7 standard for command details

Command Name	Command Code (hex)
CHECK POWER MODE	98h or E5h
DEVICE CONFIGURATION RESTORE	B1h / C0h
DEVICE CONFIGURATION FREEZE LOCK	B1h / C1h
DEVICE CONFIGURATION IDENTIFY	B1h / C2h
DEVICE CONFIGURATION SET	B1h / C3h
DOWNLOAD MICROCODE	92h
EXECUTE DEVICE DIAGNOSTIC	90h
FLUSH CACHE	E7h
FLUSH CACHE EXT	EAh
IDENTIFY DEVICE	ECh
IDLE	E3h or 97h
IDLE IMMEDIATE	E1h or 95h
INITIALIZE DEVICE PARAMETERS	91h
NOP	00h
READ BUFFER	E4h
READ DMA (with retry)	C8h
READ DMA (without retry)	C9h
READ DMA EXT	25h
READ FPDMA QUEUED	60h
READ LOG EXT	2Fh
READ MULTIPLE	C4h
READ MULTIPLE EXT	29h
READ NATIVE MAX ADDRESS	F8h
READ NATIVE MAX ADDRESS EXT	27h
READ SECTOR(S)EXT	24h
READ SECTOR(S) (with retry)	20h
READ SECTOR(S) (without retry)	21h
READ VERIFY SECTOR EXT	42h
READ VERIFY SECTOR(S) (with retry)	40h
SECURITY DISABLE PASSWORD	F6h
SECURITY ERASE PREPARE	F3h
SECURITY ERASE UNIT	F4h
SECURITY FREEZE LOCK	F5h
SECURITY SET PASSWORD	F1h
SECURITY UNLOCK	F2h
SEEK	7xh
SET FEATURES	EFh
SET MAX ADDRESS	F9h
SET MAX – FREEZE LOCK	F9h / 04h
SET MAX – LOCK	F9h / 02h
SET MAX ADDRESS EXT	37h
SET MULTIPLE MODE	C6h

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Table 7: Supported ATA Command Set (Continued)
See ATA-7 standard for command details

Command Name	Command Code (hex)
SET MAX – SET PASSWORD	F9h / 01h
SET MAX – UNLOCK	F9h / 03h
SLEEP	E6h or 99h
SMART DISABLE OPERATIONS	B0h / D9h
SMART ENABLE OPERATIONS	B0h / D8h
SMART ENABLE/DISABLE AUTOSAVE	B0h / D2h
SMART EXECUTE OFF-LINE IMMEDIATE	B0h / D4h
SMART READ DATA	B0h / D0h
SMART READ LOG SECTOR	B0h / D5h
SMART RETURN STATUS	B0h / DAh
SMART WRITE LOG	B0h / D6h
STANDBY	E2h or 96h
STANDBY IMMEDIATE	E0h or 94h
WRITE BUFFER	E8h
WRITE DMA (with retry)	CAh
WRITE DMA (without retry)	CBh
WRITE DMA EXT	35h
WRITE DMA FUA EXT	3Dh
WRITE FPDMA Queued	61h
WRITE LOG EXT	3Fh
WRITE MULTIPLE	C5h
WRITE MULTIPLE EXT	39h
WRITE MULTIPLE FUA EXT	CEh
WRITE SECTOR(S) (with retry)	30h
WRITE SECTOR(S) EXT	34h

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Reliability

Micron's SSDs incorporate advanced technology for defect and error management. They use various combinations of hardware-based error correction algorithms and firmware-based static and dynamic wear-leveling algorithms.

Over the life of the SSD, uncorrectable errors may occur. An uncorrectable error is defined as data that is reported as successfully programmed to the SSD but when it is read out of the SSD, the data differs from what was programmed. See Table 8 for the uncorrectable bit error rate for the SSD.

Table 8: Uncorrectable Bit Error Rate

Uncorrectable Bit-Error Rate	Operation
<1 sector per 10^{15} bits read	READ

Mean Time Between Failures

Mean time between failures (MTBF) for the SSD can be predicted based on the component reliability data using the methods referenced in the Telcordia SR-332 reliability prediction procedures for electronic equipment.

The table below shows the MTBF for each SSD density.

Table 9: Mean Time Between Failures

Density	MTBF (Operating Hours)
25GB	1 million
50GB	1 million
100GB	1 million

Endurance

Endurance for the SSD can be predicted based on the usage conditons applied to the device, the internal NAND component cycles, the write amplification factor, and the wear-leveling efficenty of the drive.

The table below shows the drive lifetime for each SSD density based on predefined usage conditions.

Table 10: Drive Lifetime

Density	Drive Lifetime (Total Bytes Written)
25GB	365 TB
50GB	730 TB
100GB	1460 TB

Notes: 1. TBW is based off of 8k random writes.

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Electrical Characteristics

Table 11: *SSD* SATA Typical Power Consumption[1]

Density	Idle[3]	Sleep[3]	Standby[3]	Erase	Read[2]	Write[2]	Unit
25GB	0.15	0.15	0.15	2.2	1.9	2.2	W
50GB	0.15	0.15	0.15	2.2	1.9	2.2	W
100GB	0.15	0.15	0.15	2.2	1.9	2.2	W

Notes: 1. Data taken at 25°C.
2. IOMETER MAX transfer rate with 128KB transfer size.
3. DIPM enabled.

Table 12: Absolute Maximum Ratings

Parameter/Condition		Symbol	Min	Max	Unit
Voltage input		V5	4.75	+5.25	V
Operating temperature	Commercial	T_A	0	70	°C
	Industrial		–40	+85	°C
Non-operating temperature			–55	+95	°C
Rate of temperature change			–	+20	°C/hour
Relative humidity (noncondensing)			5	95	%

Stresses greater than those listed in Table 12 may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Table 13: Shock and Vibration

Parameter/Condition	Specification
Operating shock	1500 G/1.0ms
Operating vibration	2–500Hz at 3.1G

Table 14: Recommended Operating Conditions

Parameter/Condition	Symbol	Min	Typ	Max	Unit
Power supply voltage	V5	4.75	5.00	5.25	V
Ground supply voltage	GND	0	0	0	V

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Compliance

Micron SSDs comply with the following:

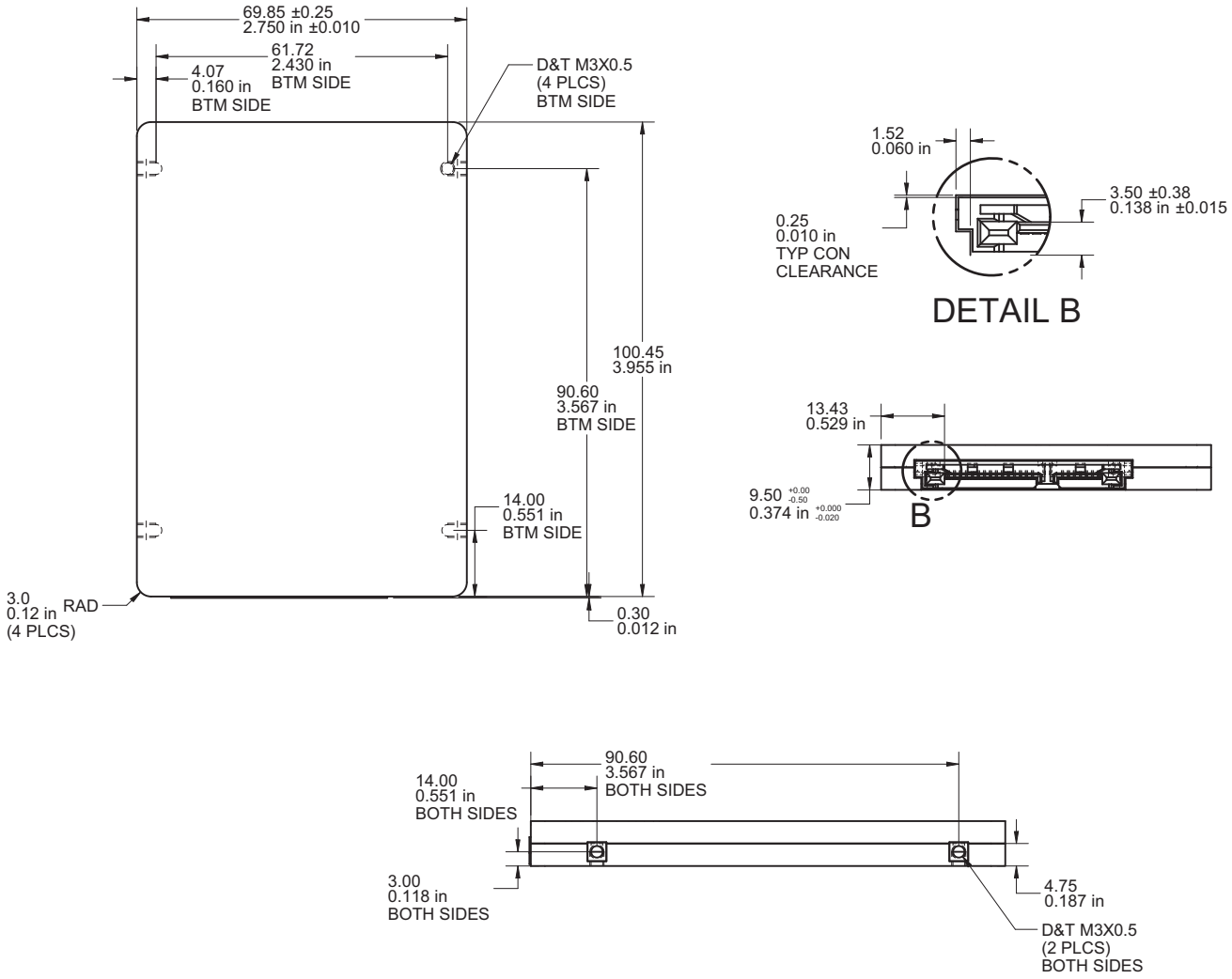
- RoHS “green” package
- CE (Europe): EN55022, 2006 Class B and EN55024, 1998 + A1: 2001 + A2:2003
- FCC: CFR Title 47, Part 15, ICES-003, all Class B
- UL (US): approval to UL-60950-1, 2nd Edition, 2007-03-27, IEC 60950-1:2005, 2nd Edition
- BSMI (Taiwan): Appproval to CNS 13438
- TUV/GS (Germany): Approval to IEC60950 / EN6095
- VCCI
- W.E.E.E.

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

Package Dimensions

Figure 4: 2.5-Inch Package (Preliminary)



Note: All dimensions are in millimeters.

8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-3900
prodmktg@micron.com www.micron.com Customer Comment Line: 800-932-4992
Micron, the M logo, and Real*SSD* are trademarks of Micron Technology, Inc.
All other trademarks are the property of their respective owners.
This data sheet contains minimum and maximum limits specified over the power supply and temperature range set forth herein.
Although considered final, these specifications are subject to change, as further product development and data characterization sometimes occur.

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor

References

The following references were used to prepare this data sheet:

- Serial ATA: High-speed serialized AT attachment, Serial ATA working group, available at www.sata-io.org
- Small Form Factor Specification SFF-8201, SFF-8223.
- Electronic Industries Association Standard, EIA-720
- Serial ATA: High-speed serialized AT attachment, Serial ATA working group
- SFF documents
- EIA-720 document

Table 15: Terminology

Acronym	Definition
ATA	Advanced technology attachment
IOPS	Input/output operations per second
PIO	Programmed input/output data transfer mode
SATA	Serial advanced technology attachment
SSD	Solid state drive
(U)DMA	(Ultra) direct memory access data transfer mode
SFF	Small form factor

Micron Technology, Inc., reserves the right to change products or specifications without notice.
©2007 Micron Technology, Inc. All rights reserved.

Downloaded from Elcodis.com electronic components distributor