



Product Manual

DiamondMax 23 Serial ATA

STM31000528AS

STM3750528AS

STM3500418AS

STM3320418AS

STM3250318AS

STM3160318AS

Revision history

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When referring to hard drive capacity, one gigabyte, or GB, equals one billion bytes and one terabyte, or TB, equals one trillion bytes. Your computer's operating system may use a different standard of measurement and report a lower capacity. In addition, some of the listed capacity is used for formatting and other functions, and thus will not be available for data storage. Seagate reserves the right to change, without notice, product offerings or specifications.

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1.0 Introduction

This manual describes the functional, mechanical and interface specifications for the following Seagate DiamondMax® 23 Serial ATA model drives:

STM31000528AS	STM3500418AS	STM3250318AS
STM3750528AS	STM3320418AS	STM3160318AS

These drives provide the following key features:

- 7,200 RPM spindle speed.
- High instantaneous (burst) data-transfer rates (up to 300 Mbytes per second).
- Perpendicular recording, Tunneling Magnetoresistive (TMR) recording heads and EPRML technology, for increased areal density.
- State-of-the-art cache and on-the-fly error-correction algorithms.
- Native Command Queuing with command ordering to increase performance in demanding applications.
- Full-track multiple-sector transfer capability without local processor intervention.
- Quiet operation.
- Compliant with RoHS requirements in China and Europe.
- SeaTools diagnostic software performs a drive self-test that eliminates unnecessary drive returns.
- Support for S.M.A.R.T. drive monitoring and reporting.
- Supports latching SATA cables and connectors.
- Worldwide Name (WWN) capability uniquely identifies the drive.

1.1 About the Serial ATA interface

The Serial ATA interface provides several advantages over the traditional (parallel) ATA interface. The primary advantages include:

- Easy installation and configuration with true plug-and-play connectivity. It is not necessary to set any jumpers or other configuration options.
- Thinner and more flexible cabling for improved enclosure airflow and ease of installation.
- Scalability to higher performance levels.

In addition, Serial ATA makes the transition from parallel ATA easy by providing legacy software support. Serial ATA was designed to allow you to install a Serial ATA host adapter and Serial ATA disk drive in your current system and expect all of your existing applications to work as normal.

The Serial ATA interface connects each disk drive in a point-to-point configuration with the Serial ATA host adapter. There is no master/slave relationship with Serial ATA devices like there is with parallel ATA. If two drives are attached on one Serial ATA host adapter, the host operating system views the two devices as if they were both “masters” on two separate ports. This essentially means both drives behave as if they are Device 0 (master) devices.

Note. The host adapter may, optionally, emulate a master/slave environment to host software where two devices on separate Serial ATA ports are represented to host software as a Device 0 (master) and Device 1 (slave) accessed at the same set of host bus addresses. A host adapter that emulates a master/slave environment manages two sets of shadow registers. This is not a typical Serial ATA environment.

The Serial ATA host adapter and drive share the function of emulating parallel ATA device behavior to provide backward compatibility with existing host systems and software. The Command and Control Block registers, PIO and DMA data transfers, resets, and interrupts are all emulated.

The Serial ATA host adapter contains a set of registers that shadow the contents of the traditional device registers, referred to as the Shadow Register Block. All Serial ATA devices behave like Device 0 devices. For additional information about how Serial ATA emulates parallel ATA, refer to the “Serial ATA International Organization: Serial ATA Revision 2.6”. The specification can be downloaded from www.sata-io.org.

2.0 Drive specifications

Unless otherwise noted, all specifications are measured under ambient conditions, at 25°C, and nominal power. For convenience, the phrases *the drive* and *this drive* are used throughout this manual to indicate the following drive models:

STM31000528AS

STM3500418AS

STM3250318AS

STM3750528AS

STM3320418AS

STM3160318AS

Specification summary tables

The specifications listed in the following tables are for quick reference. For details on specification measurement or definition, see the appropriate section of this manual.

Table 1: Drive specifications summary for 1000 and 750 Gbyte models

Drive specification	STM31000528AS	STM3750528AS
Formatted capacity (512 bytes/sector)*	1000 Gbytes	750 Gbytes
Guaranteed sectors	1,953,525,168	1,465,149,168
Heads	4	3
Discs	2	
Bytes per sector	512	
Default sectors per track	63	
Default read/write heads	16	
Default cylinders	16,383	
Recording density	1413 kbits/in max	
Track density	236 ktracks/in avg	
Areal density	329 Gbits/in ² avg	
Spindle speed	7,200 RPM	
Internal data transfer rate	1695 Mbits/sec max	
Sustained data transfer rate OD	125 Mbytes/sec max	
I/O data-transfer rate	300 Mbytes/sec max	
ATA data-transfer modes supported	PIO modes 0–4 Multiword DMA modes 0–2 Ultra DMA modes 0–6	
Cache buffer	32 Mbytes	
Height (max)	26.1 mm (1.028 inches)	
Width (max)	101.6 mm (4.000 inches) +/- 0.010 inches	
Length (max)	146.99 mm (5.787 inches)	
Weight (typical)	622 grams (1.371lb.)	
Average latency	4.16 msec	
Power-on to ready	<10.0 sec max	
Standby to ready	<10.0 sec max	
Track-to-track seek time	<1.0 msec typical read; <1.2 msec typical write	
Average seek, read	<8.5 msec typical	
Average seek, write	<9.5 msec typical	
Startup current (typical) 12V (peak)	2.0 amps	
Voltage tolerance (including noise)	5V +10% / -7.5% 12V +10% / -7.5%	
Ambient temperature	0° to 60°C per hour max (operating) -40° to 70°C per hour max (nonoperating)	
Temperature gradient	20°C per hour max (operating) 30°C per hour max (nonoperating)	
Relative humidity	5% to 95% (operating) 5% to 95% (nonoperating)	
Relative humidity gradient	30% per hour max	
Wet bulb temperature	37.7°C max (operating) 40.0°C max (nonoperating)	
Altitude, operating	-304.8 m to 3,048 m (-1000 ft. to 10,000+ ft.)	
Altitude, nonoperating (below mean sea level, max)	-304.8 m to 12,192 m (-1000 ft. to 40,000+ ft.)	
Operational Shock	70 Gs max at 2 msec	
Non-Operational Shock	300 Gs max at 2 msec	

Drive specification	STM31000528AS	STM3750528AS
Vibration, operating	2–22 Hz: 0.25 Gs, Limited displacement 22–350 Hz: 0.50 Gs 350–500 Hz:: 0.25 Gs	
Vibration, nonoperating	5–22 Hz: 2.0 Gs 22–350 Hz: 5.0 Gs 350–500 Hz:: 2.0 Gs	
Drive acoustics, sound power		
Idle**	2.6 bels (typical) 2.7 bels (max)	
Seek	2.8 bels (typical) 3.0 bels (max)	
Nonrecoverable read errors	1 per 10 ¹⁴ bits read	
Annualized Failure Rate (AFR)	0.32%	
Warranty	To determine the warranty for a specific drive, use a web browser to access the following web page: support.seagate.com/customer/warranty_validation.jsp From this page, click on the "Verify Your Warranty" link. You will be asked to provide the drive serial number, model number (or part number) and country of purchase. The system will display the warranty information for your drive.	
Contact start-stop cycles	50,000 at 25°C, 50% rel. humidity	
Supports Hotplug operation per the Serial ATA Revision 2.5 specification	Yes	

*One Gbyte equals one billion bytes when referring to hard drive capacity. Accessible capacity may vary depending on operating environment and formatting.

**During periods of drive idle, some offline activity may occur according to the S.M.A.R.T. specification, which may increase acoustic and power to operational levels.

Table 2: Drive specifications summary for 500 and 320 Gbyte models

Drive specification	STM3500418AS	STM3320418AS
Formatted capacity (512 bytes/sector)*	500 Gbytes	320 Gbytes
Guaranteed sectors	976,773,168	625,142,448
Heads	2	
Discs	1	
Bytes per sector	512	
Default sectors per track	63	
Default read/write heads	16	
Default cylinders	16,383	
Recording density	1413 kbits/in max	
Track density	236 ktracks/in avg	
Areal density	329 Gbits/in ² avg	
Spindle speed	7,200 RPM	
Internal data transfer rate	1695 Mbits/sec max	
Sustained data transfer rate OD	125 Mbytes/sec max	
I/O data-transfer rate	300 Mbytes/sec max	
ATA data-transfer modes supported	PIO modes 0–4 Multiword DMA modes 0–2 Ultra DMA modes 0–6	
Cache buffer	16 Mbytes	
Height (max)	19.98 mm (0.787 inches)	
Width (max)	101.6 mm (4.000 inches) +/- 0.010 inches	
Length (max)	146.99 mm (5.787 inches)	
Weight (typical)	415 grams (0.915 lb.)	
Average latency	4.16 msec	
Power-on to ready	<8.5 sec max	
Standby to ready	<8.5 sec max	
Track-to-track seek time	<1.0 msec typical read; <1.2 msec typical write	
Average seek, read	<8.5 msec typical	
Average seek, write	<9.5 msec typical	
Startup current (typical) 12V (peak)	2.0 amps	
Voltage tolerance (including noise)	5V +10% / -7.5% 12V +10% / -7.5%	
Ambient temperature	0° to 60°C per hour max (operating) –40° to 70°C per hour max (nonoperating)	
Temperature gradient	20°C per hour max (operating) 30°C per hour max (nonoperating)	
Relative humidity	5% to 95% (operating) 5% to 95% (nonoperating)	
Relative humidity gradient	30% per hour max	
Wet bulb temperature	37.7°C max (operating) 40.0°C max (nonoperating)	
Altitude, operating	–304.8 m to 3,048 m (–1000 ft. to 10,000+ ft.)	
Altitude, nonoperating (below mean sea level, max)	–304.8 m to 12,192 m (–1000 ft. to 40,000+ ft.)	
Operational Shock	70 Gs max at 2 msec	
Non-Operational Shock	350 Gs max at 2 msec	

Drive specification	STM3500418AS	STM3320418AS
Vibration, operating	2–22 Hz: 0.25 Gs, Limited displacement 22–350 Hz: 0.50 Gs 350–500 Hz:: 0.25 Gs	
Vibration, nonoperating	5–22 Hz: 2.0 Gs 22–350 Hz: 5.0 Gs 350–500 Hz:: 2.0 Gs	
Drive acoustics, sound power		
Idle**	2.6 bels (typical) 2.7 bels (max)	
Seek	2.8 bels (typical) 3.0 bels (max)	
Nonrecoverable read errors	1 per 10 ¹⁴ bits read	
Annualized Failure Rate (AFR)	0.32%	
Warranty	To determine the warranty for a specific drive, use a web browser to access the following web page: support.seagate.com/customer/warranty_validation.jsp From this page, click on the "Verify Your Warranty" link. You will be asked to provide the drive serial number, model number (or part number) and country of purchase. The system will display the warranty information for your drive.	
Contact start-stop cycles	50,000 at 25°C, 50% rel. humidity	
Supports Hotplug operation per the Serial ATA Revision 2.5 specification	Yes	

*One Gbyte equals one billion bytes when referring to hard drive capacity. Accessible capacity may vary depending on operating environment and formatting.

**During periods of drive idle, some offline activity may occur according to the S.M.A.R.T. specification, which may increase acoustic and power to operational levels.

