



# Ultrastar® SSD1600MM

## HGST Enterprise Storage Experience

HGST leverages decades of proven enterprise storage expertise in Serial Attached SCSI (SAS) design, reliability, firmware, customer qualification and system integration to the Ultrastar® SSD1600MM solid-state drive (SSD) family. The synergistic relationship between HGST's throughput-enhancing SSDs and traditional HDDs provides cost effective, end-to-end enterprise-class storage solutions, delivering reliability, compatibility, capacity, cost and system performance. This combination makes HGST a leading SSD/HDD provider with the experience and technology needed to meet escalating reliability, endurance and performance in the most demanding enterprise environments.

## Maximum Performance, Reliability and Endurance

The Ultrastar SSD1600MM delivers high sequential throughput, up to 1100MB/s read and 765MB/s write (12Gb/s SAS). It also delivers up to 130,000 read and 100,000 write IOPS, reaching speeds >100 times faster than HDDs and double the speed of current 6Gb/s SSDs, allowing rapid access to "hot" enterprise data for improved productivity and operational efficiency. The Ultrastar SSD1600MM family offers significant value in terms of IOPS per Watt, while reducing total cost of ownership (TCO) through low power consumption, efficient cooling and reduced space requirements.

The Ultrastar SSD1600MM family combines enterprise-grade MLC NAND Flash memory, advanced endurance management firmware and power loss data management techniques to extend reliability, endurance and sustained performance over the life of the SSD. The Ultrastar SSD1600MM family achieves an extraordinary 0.35% annual failure rate (AFR) or 2.5 million hour mean-time-between-failure (MTBF). The 1600GB capacity model endures up to 29.2 Petabytes (PB) of random writes over the life of the drive—the equivalent of writing 16 Terabytes (TB) per day for five years.

For complete end-to-end data protection and reliability, the Ultrastar SSD1600MM family incorporates the T10 Data Integrity Field (DIF) standard, extended error correction code (ECC), Exclusive-OR (XOR) parity to protect against Flash die failure, parity-checked internal data paths without an external write cache, and an exclusive power loss data management feature that does not require supercapacitors. The Ultrastar SSD1600MM family is backed by a five year limited warranty, or the maximum Petabytes (PB) written (based on capacity).

## HGST Quality and Service

HGST's Ultrastar SSD1600MM family extends the company's long-standing tradition of performance and reliability leadership. A balanced combination of new and proven technologies enables high reliability and availability to customer data. HGST drives are backed by an array of technical support and services, which may include customer and integration assistance. HGST is dedicated to providing a complete portfolio of SSD/HDD solutions to satisfy today's monumental computing needs.

## Highlights

- MLC NAND Flash for ultra-high performance and endurance
- Mainstream endurance 10DW/D for 5 years
- Best IOPS/Watt for reduced TCO
- 12Gb/s SAS interface for maximum throughput
- Advanced power loss data management technology
- Self-encrypting models conform to TCG's Enterprise specification

## Applications/Environments

- Ultra-high performance tier-0 enterprise storage
- Enterprise-class servers and high performance computing
- Space and/or power constrained environments
- Online Transaction Processing (OLTP)
- Video pre- and post-production
- Financial and e-commerce
- Database analytics



1600GB, 800GB, 400GB and 200GB  
MLC | 2.5-inch SFF | SAS 12Gb/s

## Features & Benefits

	Performance	Power	Capacity	Reliability	Integration
Feature/function	<ul style="list-style-type: none"> <li>• SAS 12Gb/s</li> <li>• MLC NAND Flash memory</li> <li>• 1100MB/s / 765MB/s sequential R/W</li> <li>• 130K / 100K IOPS random R/W</li> <li>• 110K IOPS on 70/30 mix R/W</li> </ul>	9.0 and 11.0 Watt options	<ul style="list-style-type: none"> <li>• 1600GB</li> <li>• 800GB</li> <li>• 400GB</li> <li>• 200GB</li> </ul>	<ul style="list-style-type: none"> <li>• 0.35% AFR (2.5M hours MTBF)</li> <li>• 1E-17 bit error rate</li> <li>• T10 end-to-end data protection</li> <li>• Exclusive-OR (XOR) NAND</li> <li>• Power loss data management</li> <li>• Unlimited reads, up to 29.2PB random writes (1600GB)</li> </ul>	<ul style="list-style-type: none"> <li>• HDD architecture commonality</li> <li>• Systems integration and test lab</li> </ul>
Benefit	<ul style="list-style-type: none"> <li>• 12Gb/s / 6Gb/s Active-Active Dual Port</li> <li>• Highest write performance with cost improved NAND for high endurance</li> <li>• Maximum throughput and IOPS for ultra-fast access to data; &gt;100x faster than typical HDD</li> </ul>	Improved performance with higher power option	More capacity for less space and power	<ul style="list-style-type: none"> <li>• Reduced field replacement effort</li> <li>• Enhanced error detection and correction for optimal data integrity</li> <li>• Protection against Flash die failure</li> <li>• Assures data integrity during power failure</li> <li>• Maximum endurance over the life of SSD</li> </ul>	<ul style="list-style-type: none"> <li>• Compatibility with Ultrastar SAS HDDs</li> <li>• Extensive interoperability and compliance testing</li> </ul>



# Ultrastar® SSD1600MM

## Specifications

<b>Model / Part No.</b>	HUSMM1616ASS204 / OB32167 HUSMM1616ASS200 / OB31068 HUSMM1616ASS201 / OB32143 HUSMM1616ASS205 / OB32188 HUSMM1680ASS204 / OB32166 HUSMM1680ASS200 / OB31067 HUSMM1680ASS201 / OB32146 HUSMM1680ASS205 / OB32187 HUSMM1640ASS204 / OB32165 HUSMM1640ASS200 / OB31066 HUSMM1640ASS201 / OB32145 HUSMM1640ASS205 / OB32186 HUSMM1620ASS204 / OB32164 HUSMM1620ASS200 / OB31065 HUSMM1620ASS201 / OB32144 HUSMM1620ASS205 / OB32185
<b>Configuration</b>	
Interface	SAS 12Gb/s
Capacity (GB) <sup>1</sup> at 512 bytes/sector	1600 / 800 / 400 / 200
Form factor	2.5-inch
Flash memory technology	Multi Level Cell (MLC)
Sector size support	512, 520, 528, 4K
<b>Performance</b>	
Read throughput (max MB/s, sequential 64K)	1100
Write throughput (max MB/s, sequential 64K)	765
Read IOPS (max IOPS, random 4K)	130,000
Write IOPS (max IOPS, random 4k)	100,000
<b>Reliability</b>	
Error rate (non-recoverable bits read)	1 in 10 <sup>17</sup>
MTBF <sup>2</sup> (M hours)	2.5
Annual failure rate <sup>2</sup> (AFR)	0.35%
Availability (hrs/day x days/wk)	24x7
Endurance (max PB <sup>1</sup> , random write)	29.2 / 14.6 / 7.3 / 3.6

### Power

Requirement	+5 VDC (+/-5%) +12 VDC (+/-5%)
Operating (W, typical)	9.0 and 11.0
Idle (W)	2.2

### Physical

z-height (mm)	15.0
Dimensions (width x depth, mm)	70.1 x 100.6
Weight (g, max)	187

### Environmental (operating)

Case temperature	0° to 70°C
Shock (half-sine wave)	1000G (0.5ms) 500G (2ms)
Vibration, random (G RMS)	2.16, all axis (5 to 700 Hz)

<sup>1</sup> One gigabyte (GB) is equal to one billion bytes, one terabyte (TB) is equal to 1,000GB (one trillion bytes), and one petabyte (PB) is equal to 1,000TB (one quadrillion bytes) when referring to solid-state drive or hard drive capacity. Accessible capacity will vary from the stated capacity due to formatting and partitioning of the drive, the computer's operating system, and other factors.

<sup>2</sup> MTBF and AFR targets are based on a sample population and are estimated by statistical measurements and acceleration algorithms under median operating conditions. MTBF and AFR ratings do not predict an individual drive's reliability and do not constitute a warranty.

### How to Read the Ultrastar Model Number

HUSMM1616ASS200 = 1600GB, SAS 12Gb/s  
 H = HGST  
 U = Ultrastar  
 S = Standard  
 MM = Multi level cell, mainstream endurance (10DW/D)  
 16 = Full initial capacity (1600GB)  
 16 = Capacity of this model (19 = 1920GB, (16 = 1600GB, 80 = 800GB, 40 = 400GB, etc.)  
 A = Generation code  
 S = Small form factor (vs. L for Large FF)  
 S2 = Interface, SAS 12Gb/s  
 0 = Standard (3 = 3DW/D)  
 0 = Crypto sanitize  
 (1 = TCG encryption, 4 = No encryption, 5 = TCG + FIPS certified encryption)

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