



Give your  
customers  
more

# Hitachi GST

an overview of our  
hard disk drive products

Ultrastar

**HITACHI**  
Inspire the Next



# A drive solution whatever the demand



## Embrace the future

No two jobs are the same. In your line of business, you have requirements that range from tried-and-tested computing environments to emerging applications. We're here to help you meet that requirement. And that's why we provide the broadest hard disk drive product line available today. A drive solution for every eventuality means you can choose from a full range of high-performance products – from our 2.5-inch Travelstar™ family to 3.5-inch server drives with up to one-terabyte capacity – all with reliability specs our competitors can only look up to.

# What's next in hard drives?

More happy customers

Hitachi Global Storage Technologies is always looking to tomorrow. That's why we are busy researching every possible angle to improve the performance and capacity of our hard drives.



## The terabyte era

Several lines of investigation – including patterned magnetic media and thermal-assisted recording – are set to provide major breakthroughs over the next few years, but we are looking much further ahead to emerging technologies that could totally revolutionize the way we store our data.

We have already developed the world's smallest read-head technology for hard disk drives, which is expected to quadruple current storage capacity limits to 4TB on a desktop hard drive and 1TB on a notebook hard drive.

Our researchers have successfully reduced existing recording heads by more than a factor of two to achieve new heads in the 30-50 nanometer

range – up to 2,000 times smaller than the width of an average human hair. Called 'current perpendicular-to-the-plane giant magnetoresistive' heads, Hitachi's new technology is expected to be inside products by 2009 and hit full potential by 2011. Having started the 'Terabyte Era' of storage, we are now driving it, giving consumers virtually limitless ability to store their digital content.

## Adaptable and compatible

Hitachi GST is also investing in future form factors and interfaces, to make our drives more compatible with and adaptable to emerging technologies. All our drives already incorporate proven, award-winning technologies, including self-testing and analysis tools to signal any

potential drive problems. Key components are manufactured to the highest standards, so users can always be sure of reliable, powerful performance.



Find out what more Hitachi is doing:  
[www.hitachigstwhatsnext.com](http://www.hitachigstwhatsnext.com)



# Going greener

Hard drives which are kinder to the environment



More  
environmentally  
friendly

Increasingly, we are looking for ways to create environmentally-friendly drives – that use less power, create less heat and noise and have more parts that can be recycled.

## Less power, no compromises

There is widespread concern for the environment and a growing interest in sustainable living. As a result, consumers are demanding greener, less power-hungry products. Which is why Hitachi GST has developed a range of hard drive models which find new ways to use less power but still don't make any compromises when it comes to performance.

For example, the CinemaStar P7K500 came about as a result of greener thinking. It uses high-efficiency voltage regulators to help minimize power consumption in line with Hitachi's aim to reduce power consumption in all its devices.

## Low power idle

To save energy, many of our drives are designed to switch to a low wattage idle power mode if activity pauses for longer periods. Because of this they require smaller power supplies and less cooling which, as well as being friendlier to the planet, may help extend the life of the hard drive, the host product, and any other linked devices.

## Thermal monitoring

The core temperature of the hard disk drive can be monitored intelligently. If a fan or air-conditioning has failed, the system will raise the alarm and the fault can be fixed. The system can also alternatively control the device fan to speed up (to make the disk cooler) or slow down (to make the device quieter).

## HiVERT™

Hitachi Voltage Efficiency Regulator (HiVERT), a technology developed by Hitachi GST, brings new levels of power efficiency for 2.5-inch (and some 3.5-inch) hard disk drives. Working together with other power management tools, HiVERT reduces the power draw of key hard drive electrical components by 30-percent over the previous generation, and dissipates heat more quickly too.

**Find out what more Hitachi is doing:**

[www.hitachigstwhatsnext.com/en/environment](http://www.hitachigstwhatsnext.com/en/environment)

# Hitachi Partners First Program

Together, we have the building blocks to success



Our Partners First™ program gives Hitachi GST's partners access to a wide range of invaluable tools and resources which will save you time, and help you make the most of Hitachi hard drives. This invaluable technical and business support is available just when you need it.

**We operate a three-tier, colour-coded partner system depending on your needs and the kind of business you operate. Stage one partners are Red; mid-tier partners Silver, and premier partners Black. Each is offered a package of tailored support and services.**

- **Technical support** – this includes 24x7 email and telephone support; an up-to-date, online product library of technical documents, presentations, product specifications and agency approval letters for all Hitachi hard drives; online diagnostic tools for analysing, monitoring and restoring Hitachi GST drives; and integration and developer support to help market new applications
- **Value-added support** – relationship management resources, so we can better

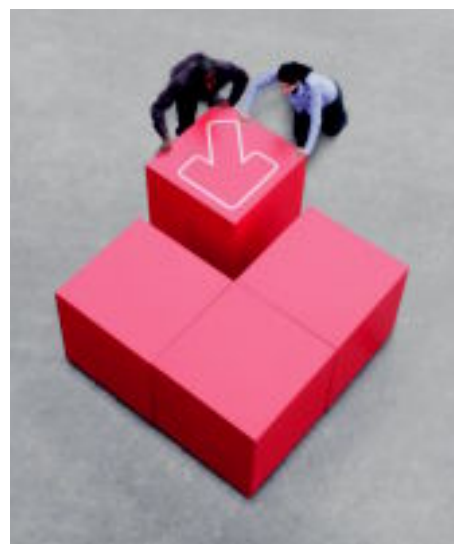
understand each other's businesses; help with the returns process via our secure website; the HDD Info Hub, a unique online interactive resource we've set up for comparing the specifications of the industry's hard disk drives; Hitachi Partners Privilege (HPP)\* program to reward partners for their loyalty and continuous efforts

- **Marketing support** – help with printed marketing materials, dealing with the Press, and profile-raising at industry events. In addition, Partners receive a quarterly e-newsletter, available in six languages, and training opportunities

\*HPP reward program applies to Asia Pacific region only.

For more information, or to register for Partners First, visit [www.hitachigst.com/partners](http://www.hitachigst.com/partners)

Partners First Program has been carefully designed to provide all the information and tools you need for selling and designing in Hitachi hard drives. Our reasoning is simple – your success is our success. By giving you access to essential tools and resources, we can build a positive, practical working relationship – one that benefits us both, and keeps us one step ahead of the competition.

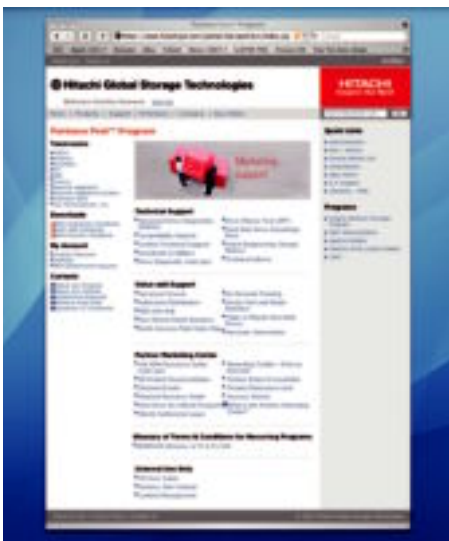


# Technical Support

Local technical support through the Hitachi Design Studios



The Hitachi Global Design Studios provides access to product qualification and integration ensuring smooth and fast launch to market. Global locations include UK, Japan, China and Taiwan.



Hitachi GST Partners First extranet provides 24x7 information and support.

The support you need, when and where you need it. And, unlike other HDD manufacturers, not in another continent or time zone, but right here on your doorstep.

## Supporting smooth integration

Technical support is not just about resolving problems. It's about specifying the correct product in the first place and ensuring that it is integrated correctly. It is also about providing hands-on training and advice on future technical trends and products to ensure that your business stays ahead of the game.

Technical support is something that we take very seriously at Hitachi. That's why we have a team of highly-skilled engineers on hand at all times. Engineers who have a deep understanding of hard drive technology and broad experience of a wide range of operating systems and environments. And that's why we have invested so much in our professionally-equipped **worldwide Hitachi Design Studios.**

They will ensure your peace-of-mind by testing our drive in your product under the most stringent of conditions – providing you with valuable information on chassis affects and environment before you go to market – ensuring the satisfaction of you and your customers.

Current global locations include the UK, Japan, China and Taiwan.

We also have teams dedicated to working in direct contact with you, our channel partners, so there is always someone on hand to answer any questions that you may have.

Visit [www.hitachigst.com/support](http://www.hitachigst.com/support) for online support resources and contact centers worldwide

**The Hitachi Design Studios provide expert advice to manufacturers and systems integrators in these areas:**

- **Recording** – digital video recorder, personal video recorder, set-top box, digital audio recorder, iVDR, closed circuit TV
- **Security and Surveillance** – CCTV systems, video streaming, audiovisual devices
- **Photo** – digital still and video cameras
- **Entertainment** – personal video player, video viewer, personal media player, MP3, flat panel TV, STB
- **Industrial** – external storage, USB applications, industrial applications (printer, copier, switch, router, PBX, robotics, test and measurement)
- **Handhelds** – smart phone, PDA, wearable PC, GPS, converged devices
- **Automotive** – automotive systems, navigation systems, telematics
- **Gaming** – game consoles (information appliances)
- **Reference designs** – provide help for developing prototype designs with hard drives

[www.hitachigst.com/partners](http://www.hitachigst.com/partners)

# Hard Drive by Hitachi

Making sure it's always Hitachi



At Hitachi, we understand the value of joint branding, and are keen to explore ways the strength of one brand can enhance and benefit another.

The Hard Drive by Hitachi icon is a means of harnessing Hitachi's reputation for quality and reliability. It's a strong endorsement, which will reassure consumers that they are buying a quality product. Which gives you an immediate competitive edge in an uncompromising marketplace.

## Hard drive by Hitachi

Hard Drive by Hitachi is an ingredient brand program enabling suppliers of Consumer Electronics (CE) devices to leverage the power of the Hitachi brand.

The icon signifies that the hard drive integrated as a key component in your product is manufactured and backed by Hitachi, a premier supplier of high quality hard disk drives. Using the Hard Drive by Hitachi icon, you can harness Hitachi's reputation for quality and reliability - as well as technology leadership - to strongly differentiate your products in today's competitive marketplace.



## Participation benefits

Hitachi's reputation for excellence extends beyond the products and services we deliver. It resonates in the way we do business. Consumers know that Hitachi stands for quality in everything we do, whether it's music, video or top computer performance applications. Seeing the Hard Drive by Hitachi icon on the outside, means dependable data storage on the inside.

**Technical qualification is required before access to Hitachi ingredient branding. To learn more about the Hard Drive by Hitachi ingredient brand program, email your local geo support. See back cover for contact details.**

## Leverage the power of the Hitachi brand

**The Hard Drive by Hitachi program allows for the Hitachi icon to be used in a wide variety of ways:**

- Sticker on product
- Packaging
- Power-on graphics
- Advertising/posters
- Promotional items
- Trade shows
- Web



# Hitachi Technologies

Unique technologies delivering stress-free storage

## Technical Highlights



### First to Market Advantage

Hitachi began manufacturing products based on Perpendicular Magnetic Recording technology in May 2006 when the company introduced the Travelstar™ 5K160 which was hailed as the most reliable and technically-advanced 2.5-inch hard drive on the market at the time. Hitachi built on this success by introducing the first 1TB drives in the first quarter of 2007 and followed through with the Travelstar 5K500, the first 500GB 2.5-inch mobile drive, in the first quarter of 2008. With the Travelstar 5K500, Hitachi has effectively eliminated the “capacity compromise” by offering consumers all the storage capacity of a desktop with the portability and convenience of a notebook.

### Hitachi Load/Unload Technology

Load/unload technology ensures that the read/write heads never come into contact with the media - even when the drive is not rotating. Some of the many benefits include increased robustness, reliability, and reduced power consumption. Hitachi is the only company to use load/unload technology right across the full product range.

### Rotational Vibration Safeguard (RVS)

Several Hitachi hard drives now have advanced Rotational Vibration Safeguard (RVS) that actually anticipates disturbances and counteracts them – maximising performance in the most arduous conditions. Vibration sensors at the edges of the disk feed forward to the actuator, warning it of oncoming disruption. In tests, this technology improves performance in business and high-end systems by as much as 300%.

### IrMnCr Read Sensor

To address the demand for increased capacity and highly reliable operation of the read sensor, Hitachi scientists developed a material and process for the manufacture of ultra-small read sensors. Use of a new read-head alloy – iridium-manganese-chromium (IrMnCr), incorporating an extremely thin layer of ruthenium in the structure to create a very high “pinning field”, resulted in the storage industry’s most stable and reliable read-sensor technology.

Hitachi GST high-performance drives come loaded with leading-edge functionality, so you know that the right tools are always at hand.

### Enhanced Adaptive Battery Life Extender

Hitachi understands the challenges its customers face in maximizing battery life in their products, and engineered the ABLE power management technology in response. ABLE enables the host system to realize the optimum power utilization from the drive, and customize power consumption at drive level to suit the specific application.

### Bulk Data Encryption

Several Hitachi hard drives now offer optional Bulk Data Encryption – a hard-drive level data security mechanism that puts users’ data effectively ‘under lock and key’, offering virtually impenetrable protection. As an alternative to protecting data through software-based encryption or system-level passwords, hard-drive level encryption guarantees better performance and a much higher level of security.

### HIVERT™

With the introduction of the Deskstar™ P7K500 drive, Hitachi GST has taken power efficiency very seriously while maintaining 7200 RPM performance. The Deskstar P7K500 provides customers with industry-leading power consumption by reducing power in both idle and active modes. This results in power savings of up to 40-percent over previous-generation products. This reduction was achieved by using the same system-on-chip (SOC) that is used in Hitachi’s Travelstar 2.5-inch mobile product line, where low power has long been a key design attribute to maximize battery life in notebook PCs.

This SOC incorporates Hitachi Voltage Efficiency Regulator Technology (HIVERT) in which switching regulators are used in place of the less power-efficient linear regulators in the voltage reduction processes.



# Hitachi GST. Setting new standards in innovation.

Pushing back storage boundaries to bring you  
the storage solutions you need.



[www.hitachigst.com](http://www.hitachigst.com)

Hitachi offers the widest range of hard drives available today. From 80GB to the world's first 1TB drive, we have a drive that can enhance your product. So why not work with the company that's driving storage innovation?

**HITACHI**  
Inspire the Next

# Plenty more room

Case study: Ultrastar™ A7K1000 1TB

Nexsan opts for 1TB enterprise-class hard drives

Nexsan Technologies is the world leader in secure and energy-efficient storage solutions, the choice of Fortune Global 500 companies, major government agencies, and leading organizations worldwide. It delivers secure storage appliances and modular, high-capacity disk storage systems for a broad range of applications.



Storing and accessing this amount of sensitive data securely and quickly means there is only one option for its award-winning products – Hitachi Global Storage Technologies' new Ultrastar A7K1000 one terabyte enterprise-class hard drives.

Nexsan Technologies provides a broad range of crucial applications, including fixed content storage and archiving, compliance and litigation support, primary storage, disk-based backup, digital video security, medical imaging, email and rich media.

Since June 2007, it has been offering storage systems featuring Hitachi Global Storage Technologies' new Ultrastar A7K1000 one-terabyte (TB) enterprise-class hard drives, which are incorporated into the company's award-winning SATABeast, SATABoy and SATABlade products. These new hard drives add 33% increased capacity over existing configurations.

Utilizing the industry's highest capacity hard drives, Nexsan has increased the total capacity of the SATABeast to 42TB, the highest of any RAID system available today, in just 4U of rack space. SATABoy jumps in capacity to 14TB in a 3U configuration and the SATABlade now provides 8TB in a 1U form factor.

"With the vast amount of high-resolution satellite imagery and aerial photography that we produce for customers, we are always looking for an optimized disk solution that allows us to get the upper hand on our capacity requirements," said Mick Garrett, CTO of i-cubed, a premier provider of geospatial imagery, management and dissemination systems.

"Since we first introduced Nexsan's SATABeast two years ago, the units have performed flawlessly and rapidly become the cornerstone

of our storage strategy. The system's increased capacity with the new Hitachi Ultrastar 1TB drives continues to scale up to suit our growing needs for maximum storage space with a minimum of power consumption and physical floor space to house it."

## Reduced power consumption, lower carbon emissions

Unique in the industry, Nexsan offers the first high-density storage arrays to deliver full enterprise-class performance and reliability along with the unparalleled energy saving benefits of AutoMAID™ (Massive Array of Idle Disks). All Nexsan storage products with AutoMAID help to reduce power consumption and carbon emissions while eliminating the performance compromise of other MAID systems. AutoMAID™ is the only MAID architecture that supports standard high-performance RAID as well as disk-based backup, VTL (Virtual Tape Libraries), and data archiving implementations.

Announced in April 2007, the Hitachi Ultrastar 7K1000 hard drive delivers the industry's highest-capacity 7200 RPM enterprise-class hard drive. The Ultrastar A7K1000 hard drive is the next generation of Hitachi's popular Enterprise SATA hard drives, which have become known for outstanding reliability in the field with performance to match.

**"Nexsan continues to lead the way in delivering the latest drive technologies, providing our customers with the highest capacities in the same compact form factors. With the Hitachi Ultrastar 1TB drives, coupled with our AutoMAID technology, we are shattering the capacity limitations of other storage systems, while keeping power consumption costs low without sacrificing performance or availability."**

Gary Watson,  
CTO Nexsan

# Ultrastar

The ultimate in confidence for your mission-critical data

## Application Highlights

Rest assured your data is being well looked after



Ensures your online transaction processing and data is in safe hands



With average seek times as fast as 3.3ms and average latency of 2ms, enterprise customers can access their data more quickly and efficiently



Rotational Vibration Safeguard (RVS) technology maintains drive performance in multi-drive systems where rotational vibration is likely to occur



15,000 RPM drive enables as much as 33-percent more I/Os per second over 10,000 RPM – speeding the processing of critical scientific data

With a complete product portfolio, the Hitachi Ultrastar hard drive range has been designed to meet every enterprise requirement. As well as best-of-breed reliability, Ultrastar offers complete flexibility with SCSI, Serial Attached SCSI, Fibre Channel and Serial ATA interfaces and capacities ranging from 73GB to an industry-leading 1TB. And with the SFF HDD and speeds of up to 15,000 RPM, there's only one brand of hard drive any enterprise product will ever need.

## Application highlights:

- **Online transaction processing:** Proven reliability and unique Hitachi technologies make the Hitachi Ultrastar the ideal solution for mission-critical enterprise computing environments like online transaction processing, data analysis and other multi-user applications
- **RAID:** Unique Hitachi RVS technology keeps drives performing in multiple drive designs
- **Scientific engineering and data analysis:** 15,000 RPM version drive as much as 33-percent more in I/Os per second over 10,000 RPM equivalent
- **Media streaming:** High speed and cache levels up to 16MB ensure multi-users are not left waiting
- **Data warehousing**
- **Imaging systems**
- **Storage Area Network (SAN)**
- **Network Attached Storage (NAS)**
- **Fully supported integration:** High-level technical back-up from regional Hitachi Design Studios ensures smooth integration
- **Proven reliability** with a low cost-per-megabyte.
- **Capacities up to 1TB**
- **Small form factor (SFF):** Designed to meet the changing requirements of the data centre and optimized for the power and performance requirements of servers

## What are small form factor drives?

At 2.5 inches, they offer distinct size benefits over traditional 3.5-inch enterprise drives, allowing RAID configurations to be more densely populated, providing high performance while reducing power consumption.

### Benefits:

- 178% greater performance than 3.5-inch hard disk drives
- 50% smaller footprint to be configured much more densely in multi-drive systems
- Rotational vibration tolerance, decreasing the risk of failure
- Lower power consumption, helping to reduce costs



# Ultrastar

Performance and reliability for the most demanding server environments

## Product Highlights

73GB to 1TB | 7200, 10,000 and 15,000 RPM | Seek times up to 8.2ms



Ultrastar's unbeatable stability, reliability and performance has made it the drive of choice for top OEMs worldwide.

Unlike other hard disk manufacturers, Ultrastar drives are supported by high-level technical back-up from regional Hitachi Design Studios. This ensures smooth integration, wherever Ultrastar is applied.



## Full range of hard drives for enterprise storage

Hitachi offers a full range of products to address the different requirements of the enterprise market:

- The 15,000 RPM Ultrastar 15K450 and Ultrastar 15K300
- The 7200 RPM Ultrastar A7K1000, and the small form factor (SFF) 10,000 RPM
- Ultrastar C10K147

These new Ultrastar drives are built on technology proven for reliability, leveraging the system architecture and electronics of their predecessors. They target a broad range of enterprise storage systems, cycle storage applications to servers, meeting the unique needs of three critical segments of the enterprise storage hierarchy.

### Ultrastar A7K1000

- **Capacity:** 1TB, 750 and 500GB
- **Application:** Enterprise-class reliability and performance for lower duty cycle enterprise applications such as RAID arrays, tiered storage, nearline storage, and disk-to-disk backup
- 3Gb/s Serial ATA for configuration flexibility
- Enhanced Rotational Vibration Safeguard (RVS) for robust performance in multi-drive environments
- Five year warranty

### Ultrastar 15K450

NEW

- **Capacity:** Up to 450GB
- **Application:** Ideal for demanding enterprise computing environments like Online Transaction Processing (OLTP), intensive data analysis and other multi-user applications
- Large 16MB cache size minimizes command overhead
- Serial Attached SCSI, Fibre Channel or SCSI interfaces for configuration flexibility
- Mature design ensures greater reliability and faster qualification time

### Ultrastar 15K300

- **Capacity:** 300, 147 and 73GB
- **Application:** Ideal for demanding enterprise computing environments like Online Transaction Processing (OLTP), intensive data analysis and other multi-user applications
- Large 16MB cache size minimizes command overhead
- Serial Attached SCSI, Fibre Channel or SCSI interfaces for configuration flexibility
- Mature design ensures greater reliability and faster qualification time

### Ultrastar C10K147

- **Capacity:** 147 and 73GB
- **Application:** Performance and reliability with lower power consumption and space requirements to meet the needs of real-time server environments such as blade servers, 1U and 2U rack-mounted servers, Online Transaction Processing (OLTP) and mission-critical applications
- 50% smaller footprint and 40% reduction in z-height than traditional enterprise drives
- Optimal power and space efficiencies
- 10,000 RPM rotational speed for enterprise-class performance
- 3Gb/s Serial Attached SCSI supports high data throughput and scalability

# Ultrastar

Proven design for extreme performance and reliability

## Specification Highlights



Hitachi load/unload ramp

Performance and reliability are key requirements for enterprise-class hard drives. The mature design of the Ultrastar range means greater reliability, helping achieve shorter qualification times.

	Benefits	Ultrastar A7K1000	Ultrastar 15K450	Ultrastar 15K300	Ultrastar C10K147
Capacity	Wide range of popular drive capacities up to a massive 1TB	1TB, 750 and 500GB	450 and 300GB	300, 147 and 73GB	147 and 73GB
Performance					
Speed (RPM)	Super fast operation	7200	15,000	15,000	10,000
Data buffer (MB) <sup>2</sup>	Super fast read/write response time	32MB	16MB	16MB	16MB
Rotational Vibration Safeguard	Maintains drive performance in high vibration environments and multi-drive systems	■	■	■	■
Average seek time	Faster data access	8.2ms	3.4 / 3.4ms	3.6 / 3.4 / 3.4ms	3.7ms
Media transfer rate (max. Mbits/sec)		1070	2090	1441	1057
Interface transfer rate (max. Mb/sec)	Faster system boot-up. 300Mb/s burst rate for faster data access	300	300 / 400	320 / 300 / 425	300
Sustained data rate (Mb/sec)		85-42 (zone 0-29)	180-112 (zone 0-22)	123-72 (zone 0-19)	89-55 (zone 0-19)
Configuration					
Interface	Ease of integration and configuration flexibility	3Gb/s Serial ATA	3Gb/s Serial Attached SCSI 4Gb/s Fibre Channel Arbitrated Loop	Ultra320 SCSI 3Gb/s Serial Attached SCSI 4Gb/s Fibre Channel Arbitrated Loop	3Gb/s Serial Attached SCSI
Reliability					
Load / unload ramp	minimises handling damage during integration	■	■	■	■
Fluid Dynamic Bearing spindle motor	High reliability and low acoustics	■	■	■	■
Environmental					
Acoustics Idle (Bels)	Quieter system operation	2.9	3.7	3.5	2.9

One GB is equal to one billion bytes when referring to hard drive capacity. Accessible capacity may be less.

<sup>2</sup>Portion of buffer capacity used for drive firmware.

# Notes



A series of horizontal lines for writing notes, consisting of 25 evenly spaced lines.

Hitachi's advanced disk drive technologies deliver performance, reliability and security across the range. Whether for desktops, video recorders, closed circuit TV applications, online transaction processing, PC gaming machines, ATA servers or disk-to-disk backup and recovery, our technology means that Hitachi drives both meet and exceed the highest expectations.

## Hitachi Global Storage Technologies

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One GB is equal to one billion bytes and one TB equals 1,000 GB (one trillion bytes) when referring to hard drive capacity. Accessible capacity may be less.

[www.hitachigst.com](http://www.hitachigst.com)

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