



SAMSUNG

Samsung Hybrid Hard Drive

Reliable Storage Combining the Best of
Flash and Magnetic Media



The HDD offers
unique advantages:

- **Boot time up to 30% faster**
- **One third less power consumption**
- **Significantly improved reliability**

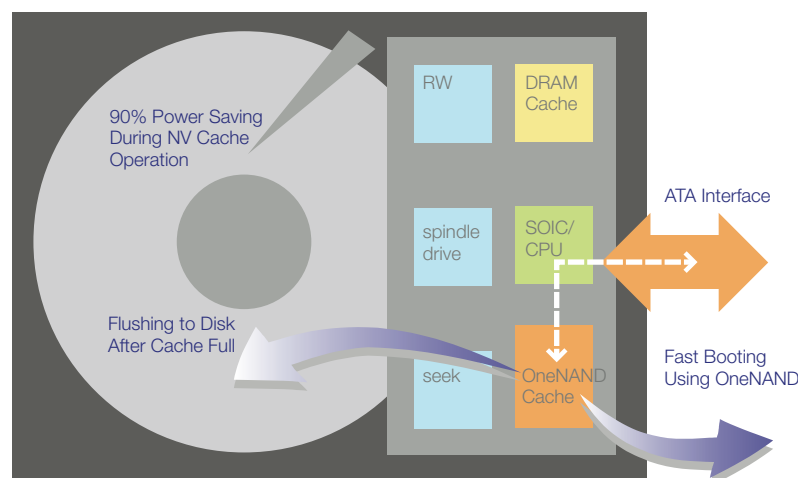
Delivers Unmatched Price/Performance for Mobile PCs

Samsung's award-winning new Hybrid Hard Drive (HHD) combines a hard disk drive with OneNAND™ Flash memory, representing a next-generation approach to storage that offers faster boot and resume times, increased battery life and greater reliability compared to traditional magnetic media technology. The OneNAND Flash from memory leader Samsung functions in the HHD as a write cache during normal operation, saving power and reducing the chance of drive failure. It also acts as a read cache during boot/resume and when specific applications are launched to accelerate system performance.

Samsung's OneNAND Flash is an optimal choice for the HHD as the result of its industry-leading read/write performance and the superior reliability of its SLC cell structure. This single-chip flash combines the ultra-high density of NAND with the simplified interface of NOR at very attractive price points. The flash memory is integrated into the hard drive architecture, storing write data and thus enabling the spindle motor to be kept idle most of the time. When this flash-based write cache is filled, the data is automatically written to the disc.

The HHD is enhanced with Windows® ReadyDrive™, one of the performance features in the Windows Vista™ operating environment. The Samsung HHD is a 2.5-inch drive with 256 megabytes of flash memory and a capacity of up to 160 gigabytes.

OneNAND Flash Caching Solution for HHD



The OneNAND Flash-based write cache within the HHD allows the platters to be kept idle 99% of the time; they spin briefly when this cache is full and the data is then automatically saved to the disc. Besides reducing power and increasing reliability, the inclusion of solid-state memory in the drive significantly cuts boot time.



Samsung's HHD gives Windows Vista portable PCs new levels of performance and reliability, enabling the next evolutionary step for notebook computers. Hybrid disk drives will make up 35% of all hard drives shipped with mobile devices by 2010.

HHD Offers Cost-Saving Features

Since the HHD's platters are idle 99% of the time, they are much less susceptible to shock damage. In addition, the HHD operates at a lower temperature than a traditional hard drive, which also reduces the likelihood of damage. This helps improve reliability significantly, reducing the incidence of hard drive failures so common in mobile PCs and also lowering repair and maintenance costs. Another advantage is one third less power consumption, which extends battery life before a recharge is needed.

Better Responsiveness

The HDD's nonvolatile flash cache can be populated with key data before a shutdown or suspend, which reappears within a second or less after a resume or reboot. By writing portions of the S4 suspend file to this cache, resume times can be reduced. Keeping key portions of the operating system resident in the cache can also reduce start-up time.

Application Acceleration Can be Customized

The quick responsiveness resulting from the OneNAND Flash cache can be applied to specific applications selected by an OEM or end user. These applications can be "pinned" into the HHD's cache, greatly improving responsiveness. This enables OEMs to determine which features – such as media screens, support information or others – they would like to make instantly available to end users.

The Future of Flash for Storage

The HHD demonstrates the expanding use of NAND flash for storage applications. While flash memory brings increased speed, performance and reliability to mobile PC storage, another advantage is the

Key Features and Benefits

BETTER PERFORMANCE

- Boot time up to 30% faster
- Instant-on applications can be "pinned" to the OneNAND cache

POWER REDUCTION

- One third less power consumption than a traditional hard drive
- Extends time before battery recharge needed

IMPROVED RELIABILITY

- Write cache keeps the platters idle 99% of the time
- Significant increase in reliability
- Less lost data, fewer repairs & servicing

SPECIFICATIONS

Interface: SATA 1.5Gbps
 Buffer DRAM size: 8MB
 OneNAND Flash write cache: 256MB
 Rotational speed: 5400rpm
 Average latency: 5.6ms
 Average read seek time: 12ms
 Capacities: 80GB, 120GB, 160GB

promise of ever-greater density within a small space. NAND flash density has been doubling every year, compared to a doubling every two years for magnetic storage. As densities continue to climb while costs decrease, the use of NAND flash for storage solutions will undoubtedly grow well beyond the current level. International Data Corp. predicts that hybrid disk drives will make up 35% of all hard drives shipped with mobile devices by 2010.