

Annual Report 2004  
SINGULUS TECHNOLOGIES

# Focus on New Technologies





# The worldwide demand for storage capacity increases nearly daily.

## Who Will Win the Race?

The advent of high definition television (HDTV) and the development of increasingly complex video games will give rise to a demand for greater storage capacity than is now available on DVD.

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## Essay: Third Generation Optical Storage Media Who Will Win the Race?

### HD DVD versus Blu-ray Disc

The advent of high definition television (HDTV) and the development of increasingly complex video games will give rise to a demand for greater storage capacity than is now available on DVD.

A contest between two formats looms on the horizon as the mass marketing of the third generation of optical storage media ramps up. Reminiscent of the Video 2000 (Grundig), Betamax (Sony), and VHS (JVC) versions of the video cassette invented in the mid-seventies, two new formats are now appearing on the market that will greatly increase the storage capacity of discs. Both are based on the shorter wavelength blue laser which allows for more data storage density.

Both manufacturing groups want backward-compatible devices, i.e., players and recorders that can also read CDs and DVDs. It is possible that for the mid-term both formats will be concurrently produced for different applications.

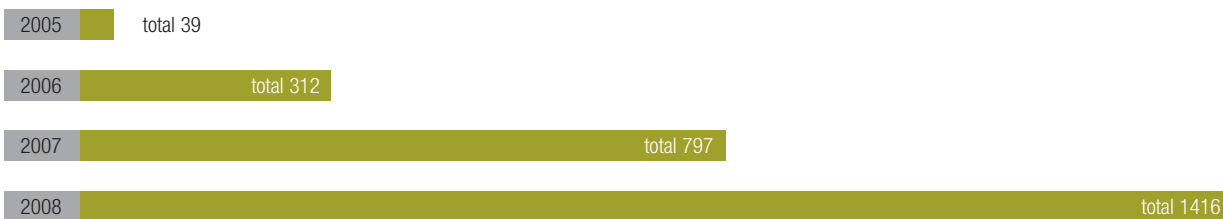
HD DVD may conceivably be first employed for private use and Blu-ray for professional use. The technical performance of the latter is greater when compared to the DVD format.

### HD DVD: 15/30 Gbyte

A recorded single-layer HD DVD can store up to 15 Gbytes of data while a dual-layer disc stores up to 30 Gbyte. Manufacturers claim these discs can store up to four hours of high definition films. The first discs are scheduled to be released in late 2005.

A number of strategic steps were recently implemented by the HD DVD Promotion Group led by Toshiba that were designed to transform this format into the dominant movie, software, and computer gaming storage medium. This alliance includes equipment manufacturers such as NEC, Thomson/RCA, and Sanyo, and as of November 2004 (within the framework of a non-exclusive agreement), Hollywood studios including Disney, Warner Video, Paramount.

## Market Development Blu-ray and HD DVD (worldwide in million Disc)



Source: Understanding & Solutions, Feb. 2005

The principal argument made by HD DVD proponents is that the new discs will be more cost-effective than Blu-ray discs. Industry insiders believe that this may be true only for the short-term. In the long run, manufacturing costs for the two formats may be comparable.

SINGULUS is currently working on the mass production of HD DVD replication systems in close cooperation with Memory Tech Corp., Japan, one of the world's largest DVD producers.

#### Blu-ray: 25/50 Gbyte

The second format is known as Blu-ray. Its single-layer version stores 25 Gbyte of data, its dual-layer version, 50 Gbytes. While the manufacturing technology for HD DVD is essentially comparable to DVD, the Blu-ray format will require completely new process and system technology.

The group of Blu-ray proponents led by Sony is backed by a large number of equipment manufacturers including Dell, HP, Hitachi, LG, Sharp, Philips, Matsushita (Panasonic), Canon, Ricoh, and Kenwood as well as film studios such as MGM, 20th Century Fox, Disney, and Columbia Tristar. With an 8,000-title color film library, the MGM studio acquired by Sony during the second half of 2004 is ranked No. 1 in the movie world.

Sony was the first company in the world to introduce Blu-ray recordable and rewritable recorders to the market in 2004. "Playstation 2", the leading global game console distributed by Sony, will be succeeded by a soon-to-be-released, mass-produced Playstation 3 model equipped with Blu-ray drives. In November 2004, SINGULUS and Sony entered into a Blu-ray replication line development alliance.



