World's First 3 Generation-Compatible HD DVD Drive

December 20 2004

NEC Corporation today announced that it has completed the development of technology capable of playing back HD DVDs, DVDs, and CDs with a single optical head, enabling creation of the world's first half height size drive suitable for desktop computer installation.

The main features of this prototype drive are as follows:

Realization of three-wavelength-compatible optical head.
- This compatible head technology was developed by using three lasers,

the blue, red and infrared laser diodes ("LD"), as the light source, thus enabling optimal reading of each disc through the optical head using a single objective lens.
- Correction of the difference in substrate thickness and wavelength, which causes spherical aberration, was corrected by changing the magnification of the objective lens. Control of the numerical aperture of the objective lens corresponding to each disc format is enabled by an aperture control element that features wavelength selectivity, which realizes stable reading.

Realization of 3-generation-compatible system LSI.
- Compatibility function and system operation was achieved by overcoming the physical format difference between CD, DVD and HD DVD through the development of system LSI.

Half height size capable of installation in desktop PCs.
- Realization of the completed prototype by integration of all the functions compactly including the 3-generation compatible optical head.
- Reduction of the size to meet those of the average current DVD/CD compatible drives through the development of a compact circuit board utilizing 3-generation-compatible system LSI.

Realization of stable operation on the compatible drive.
- In order to achieve not only high density and large capacity but also stable operation for HD DVDs, an adaptive PRML system was developed, and an ETM modulation code was adopted. The ETM code is suitable for the PRML system. By adoption of this adaptive PRML system and ETM code, amplitude margin deterioration is compensated for by stable high-density playback operation.
- Drive operation for DVDs and CDs is realized through maximum exertion of current DVD/CD compatible drive firmware technology and LSI technology, which was developed for the present DVD combo drive business.

The development of drive firmware technology, system LSI technology and HD DVD/DVD/CD-compatible optical head technology enables realization of a compact HD DVD drive and its ease of incorporation into personal computers.

Recently, high-definition contents are increasing with the spread of high definition, large screen displays, and the start of digital terrestrial TV broadcasting etc. It is anticipated that the need for recording and playing back high-definition digital contents on optical discs in the home and on personal computers will continue to grow.

NEC and Toshiba have proposed the "HD DVD" format, which has blue LDs as its light source, to the DVD Forum, based on the concept that compatibility with present DVD discs, which has spread rapidly, is of great importance for the spread of next-generation optical discs capable of recording and playing back high-definition video. The DVD Forum has already approved the HD DVD-ROM and Rewritable disc formats. The HD DVD-recordable format was approved in September, 2004, in version 0.9. NEC, along with Memory-Tech Corporation, SANYO Electric Co., Ltd. and Toshiba Corporation, are currently making progress with preparations to get the HD DVD Promotion Group underway in order to aid the spread of these formats, and it is expanding its activities such as collaborative promotion at exhibitions etc.

In general, HD DVD employs blue LDs with shorter than conventional wavelength as its light source to enable higher recording density. In order to realize compatibility with current discs, such as CDs and DVDs, a large number of parts are required resulting in a large-sized drive. To date this has been one of the major challenges to overcome. NEC's new development realizes a small, slim HD DVD drive, which can read and write 3-generations of optical discs, HD DVDs, DVDs and CDs, with a single optical head. NEC will continue advancing and accelerating its development toward commercialization of the HD DVD drive, in turn

contributing to the spread of the HD DVD format.