

ONFI Offers Easy Design, Full Features, and a Future of Innovation



Open NAND Flash Interface

The Open NAND Flash Interface (ONFI) workgroup standardized the traditional NAND Flash interface and expanded it, developing a backward-compatible synchronous interface for higher I/O throughput. The ONFI specifications provide consistent NAND behavior across vendors, enabling greater system compatibility, reducing design time, and offering advanced features, while creating a platform for shared innovation. The ONFI specifications ensure NAND memory works in almost any design.

ONFI Addresses Inconsistencies

In May 2006, Hynix, Intel, Phison, Sony, ST Microelectronics, and Micron Technology recognized that inconsistencies in NAND Flash functions and commands significantly increased the effort required to qualify new NAND devices. These inconsistencies complicated software and firmware development and cost additional time for engineering and testing.

For example, something as simple as device identification using a READ ID command was not consistent from one NAND Flash maker's products to another's, or even across product families from the same NAND manufacturer. Designers wouldn't know how many bytes to expect in response to a READ ID command from one device to the next without reading the data sheet. Some NAND Flash devices would return three bytes, some four, and some five. And the data returned to the host from the NAND device might not provide useful information like device capabilities.

Four Reasons to Choose ONFI-Compatible NAND

1. Parameter Page

Provides the controller with all of the relevant capabilities for fast and easy design, qualification, and testing.

2. Source Synchronous Data Interface

The bidirectional source synchronous DQS and scalable I/O make optimizing one NAND device (or sixteen) easy and provide some of the fastest NAND data rates possible today.

3. Standardized Compatibility

Enables pin and function drop-in compatibility and integration.

4. New BGA Package

ONFI's take on this industry-standard package accommodates both asynchronous and source synchronous interfaces, reduces noise, and provides excellent signal integrity.

Specification History

Together the ONFI workgroup developed its 1.0 specification in just seven months, creating a parameter page that describes NAND Flash features, manufacturing information, memory organization, I/O and array timing, and other vendor-specific data—solving the READ ID problem and many other inconsistencies. In February 2008, ONFI ratified its 2.0 specification and added an industry-standard 100-ball BGA package and a source synchronous data interface that significantly boosts I/O speeds while maintaining backward compatibility with the asynchronous interface. And most recently, in February 2009, ONFI ratified its 2.1 specification, which contains a number of new features that deliver speeds of 166 MB/s and 200 MB/s, plus other enhancements to increase power, performance, and ECC capabilities.

Today, there are more than 80 ONFI member companies working together to ensure that NAND Flash memory is easy to design in, backward compatible, and open for new development.

The Benefits of Standardization

NAND Flash process technology is advancing at a dizzying pace. In just the last three years it has migrated from 90nm technology to Micron's industry-leading 34nm process. With the technology changing that quickly, designers will likely have to qualify a new NAND device at least once over the typical three-year life span of a consumer product.

For controllers and NAND Flash devices that are not ONFI-compliant, the requalification process involves software and firmware development; driver modifications and testing; and product-level testing. If engineers are required to modify the command set or update the addressing scheme, qualifying a new NAND device can take even longer.

Having an ONFI-compatible controller and NAND device makes the transition process easier and less time consuming. Though there may be some differences between the original NAND Flash device and the new one, the new one electrically describes its capabilities. The ONFI-compatible controller can read these differences and configure itself accordingly. Ultimately, ONFI compatibility saves time and money and reduces the number of resources required.

Features

- 166 MB/s and 200 MB/s speeds
- Increased power management
- Enhanced ECC information
- Parameter page that describes device architecture and capabilities
- Source synchronous data interface
- Backward compatibility with asynchronous data interfaces
- Low-power DDR I/O
- Scalability for high-density applications
- Industry-standard 100-ball BGA package

Applications

- Flash cards
- USB flash drives
- Solid state devices (SSDs)
- Digital media players
- Digital cameras
- Mobile handsets
- Portable navigation devices (PNDs)
- Navigation systems
- Industrial applications
- Enterprise applications
- Network applications

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