UFS (Universal Flash Storage) for Consumer & Industrial

UFS: Boosting Performance in Demanding Applications

Designed to be the next-generation of higher performance embedded storage after e-MMC, KIOXIA's Universal Flash Storage (UFS) brings ultra high-speed read/write performance, low power consumption and quick application launch times demanded by a wide range of digital consumer products.

UFS has a serial interface, which reduces the number of signal pins, simplifying routing. It also supports full duplex operation, enabling simultaneous reading and writing between the host processor and the UFS device. This boosts overall system performance and improves the performance of mobile devices.

KIOXIA's UFS solutions are compliant with JEDEC-UFS Version 2.1/3.0/3.1, and integrate the company's BiCS FLASH™ 3D flash memory with a controller in a JEDEC-standard package.

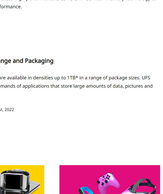
› Racing ahead with Universal Flash Storage

Key Features of KIOXIA UFS (Universal Flash Storage)

- Serial Interface
- High-Speed Reads/Writes
- Low pin count
- 32GB, 64GB, 128GB, 256GB, 512GB, 1TB
- 11 x 13mm and 11.5 x 13mm 153ball BGA package
- JEDEC Standard

UFS 4.0 (UFS version 4.0)

UFS 4.0 offers lightning fast embedded storage transfer speeds allowing next-generation smartphones and mobile applications to take advantage of 5G mobile networks. UFS 4.0 incorporates MIPI M-PHY 5.0 High-Speed Gear 5 and UniPro2.0, and supports theoretical interface speeds of up to 23.2Gbps per lane or 46.4Gbps per device. UFS 4.0 is backward compatible with UFS 3 so existing platforms can use the latest generation of flash Memory technology used in UFS 4.0, while incorporating all of the existing UFS 3.1 features.



Faster Performance

Sequential read and write performance of UFS 4.0 devices has improved by approximately 100 and 95 percent respectively, over previous generation devices. Write booster technology is incorporated to boost sequential write speeds for faster downloads, make high definition video recording storage quicker, and speed up mobile gaming.

Small Package Size

UFS 4.0 supports a small 11x13x0.8mm* package for additional space savings in mobile applications, making handsets even smaller and sleeker.

* Available in the UFS 4.0 lineups of 128GB and 256GB products

Two Types of Managed Flash by Bus Interface

KIOXIA offers UFS and e-MMC, a family of high-capacity Flash Memories with an integrated controller. These Flash Memory solutions provide ECC and other control functions that are optimized for each Flash Memory technology generation. UFS and e-MMC reduce the workload on the host processor, simplify product development, shorten time-to-market and increase ease of use memory products.

Management Feature includes Bad Block Management, Wear Leveling and Garbage Collection.

Compared to e-MMC, UFS Delivers:

- A faster interface
- Higher performance for reads and writes
- Higher density options
- Support for full duplexing
- Better power efficiency

KIOXIA UFS Key Technology

WriteBooster Functionality

WriteBooster enhances write performance by utilizing the existing user data area as a temporary SLC buffer without sacrificing capacity. Maximum SLC buffer size can be configured by the host at device configuration and the host can keep writing data to the buffer until the buffer is filled.
This feature is enabled dynamically during operation by the host depending on system performance requirements of 5G and other applications.

Host Performance Booster (HPB)

HPB Ver. 2.0 improves random read access performance by caching logical to physical translation tables (L2P table) from the device to the host side memory, and the host can initiate read operation along with L2P table so the device can simply read out data from the physical address provided by the host.
This feature can enhance random read access over wide-range addresses, which usually results in a performance drop due to multiple table updates in the device.

Advanced Technology

KIOXIA UFS utilizes high-performance BiCS FLASH™ 3D flash memory technology to optimize performance.

Density Range and Packaging

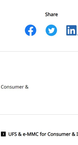
UFS devices are available in densities up to 1TB* in a range of package sizes. UFS meets the demands of applications that store large amounts of data, pictures and video.

* as of August, 2022

KIOXIA UFS Key Applications

Client Computing

Notebook / Ultrabook™ / Tablet / Desktop PC / Gaming PC

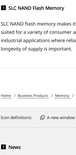


Mobile

Smartphone / Smartwatch / Smart glasses

Consumer

Game console / Smart TV / Virtual Reality Headsets / Set-Top-Box/Digital Video Recorder / Smart speaker / Smart home / Wearables / Home Health / Home Network



Industrial

Automation / Digital Healthcare / Transportation / Surveillance / Robot / Drone / Security / Digital Signage / Networking (5G area network) / PoS (Point of Sales)

Learn and Evaluate

UFS: The Ideal Replacement for e-MMC (PDF : 1.2MB)

Universal Flash Storage (UFS) (PDF : 737KB)

New Use Cases for Universal Flash Storage (PDF : 918KB)

UFS Spec

*Table can be scrolled horizontally.

Capacity	Part Number	UFS Version	Max Data Rate (MB/s)	Supply Voltage			Operating Temperature (°C)	Package Size (mm)
				V_{CC} (V)	V_{CCQ} (V)	V_{CCQ2} (V)		
32GB	THGAF8G8T23BAIL	2.1	1160	2.7 to 3.6	- (1)	1.70 to 1.95	-25 to 85	11.5x13.0x0.8
64GB	THGAF8G9T43BAIR							11.5x13.0x1.0
128GB	THGJFAT0T44BAIL	3.1	2320	2.4 to 2.7, 2.7 to 3.6	1.14 to 1.26	- (2)	-25 to 85	11.5x13.0x0.8
256GB	THGJFAT1T45BAIR							11.5x13.0x1.0
256GB	THGJFGT1E45BAIP							11.0x13.0x0.8
512GB	THGJFAT2T84BAIR							11.5x13.0x1.0
512GB	THGJFGT2T85BAIU							11.0x13.0x1.0
1TB	THGJFHT3T84BAIG							11.5x13.0x1.2
128GB	THGJFJT0E25BAIP	4.0	4640	2.4 to 2.7	1.14 to 1.26	- (2)	-25 to 85	11.0x13.0x0.8
256GB	THGJFJT1E45BATP							11.0x13.0x0.8
512GB	THGJFJT2T85BAT0							11.0x13.0x0.95

(1) This product supports dual-supply operation at V_{CC} and V_{CCQ}. V_{CCQ2} need not be supplied.
(2) This product supports dual-supply operation at V_{CC} and V_{CCQ}. V_{CCQ2} need not be supplied.

Support

Inquiries / Support Regarding Business Products

Please contact us if you have any technical questions, requests for materials, are interested in samples or purchases of business products (Memory, SSD), etc.

Related Links

What is the 3D Flash Memory "BiCS FLASH™"?

In 2007, KIOXIA announced the world's first 3D flash memory technology. Presenting our cutting-edge technologies, along with the key points of innovation and our efforts toward further increases in capacity.

What is NAND Flash Memory?

KIOXIA invented the world's first NAND flash memory in 1987. This is an explanation of the structure of flash memory and the mechanism of data storage.

What is Multi-level Cell Technology?

"Multi-level cell technology" is one of the main technologies realizing larger capacity flash memory. The 1 Gbit MLC NAND flash memory launched by KIOXIA in 2001 was the first application in the world of multi-level cell technology to a NAND flash memory product.

Share

UFS & e-MMC for Consumer & Industrial

› UFS (Universal Flash Storage) for Consumer & Industrial
› e-MMC for Consumer & Industrial

BiCS FLASH™ | TLC & QLC

BiCS FLASH™ three-dimensional (3D) vertical flash memory cell structure enables it to surpass the capacity of mainstream 2D (planar) flash memory.

UFS & e-MMC for Consumer & Industrial

KIOXIA's managed flash memory solutions help customers simplify system development, reduce host processor workload, shorten time to market, and improve ease of use.

UFS & e-MMC for Automotive

KIOXIA offers a broad density lineup of high-speed UFS and e-MMC memory for automotive applications, and is well positioned to support data storage demands of increasingly complex automotive applications.

SLC NAND Flash Memory

SLC NAND flash memory makes it ideally suited for a variety of consumer and industrial applications where reliability and longevity of supply is important.

XL-FLASH | Storage Class Memory (SCM)

XL-FLASH is designed to address the performance gap that currently exists between volatile memories such as DRAM and current flash memory.