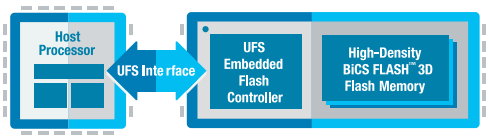
KIOXIA

UFS: *The* Ideal Replacement for e-MMC

KIOXIA delivers flash-based products for next-generation storage applications. Having invented NAND flash over 30 years ago, KIOXIA is now one of the world's largest flash memory suppliers – and continues to move the technology forward.

WHAT IS UFS?

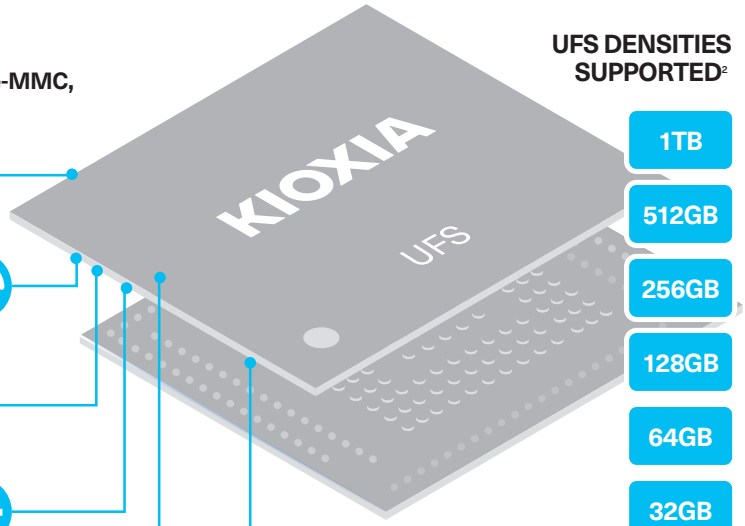
UFS[1] (Universal Flash Storage) is a JEDEC-standard, non-volatile managed flash device. It was developed to be the high-performance replacement to e-MMC[3] for embedded memory solutions.



FEATURES

When compared to e-MMC, UFS delivers:

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



UFS DENSITIES SUPPORTED[2]

- 1TB
- 512GB
- 256GB
- 128GB
- 64GB
- 32GB

Automotive Support

- AEC-Q100
- Extended temp range
- Enhanced reliability

Interface Speed[5]

UFS version 4.0

supports **4.64GB/s**

e-MMC version 5.1[3]

supports **400MB/s**

DESIGN CONSIDERATIONS

Use UFS when:

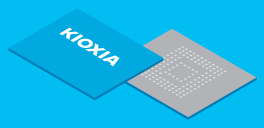
- **Higher densities** are needed (from 32GB to 1TB)
- **Enhanced performance** is desired (UFS provides high-speed read/write performance with good power efficiency)
- **SoCs that interface** to UFS are available

Use e-MMC when:

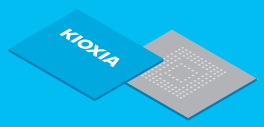
- **Lower densities** are needed (4, 8, and 16GB)
- **SoC-supporting** UFS interface is not available

LEADING THE WAY FOR UFS

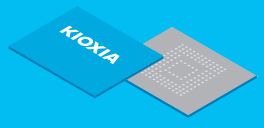
Feb. 2022 — Introduced next-gen UFS with MIPI M-PHY v5.0 used in UFS Ver. 4.0[4]



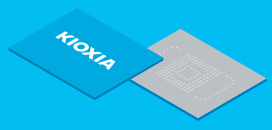
Feb. 2020 — UFS Ver. 3.1 introduced



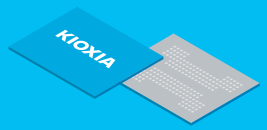
Jan. 2019 — First to sample UFS Ver. 3.0



Feb. 2013 — First to introduce UFS samples



Jun. 2007 — First to announce 3D flash memory technology



1987 — NAND flash memory invented

APPLICATIONS

Smartphones | AR/VR | Tablets/2-in-1 | Automotive | Streaming Media | Smart Speakers

The Global Universal Flash Storage Market size is expected to reach **$13.4 billion by 2025**

Source: Forward Insights[6]

[1] Universal Flash Storage (UFS) is a product category for a class of embedded memory products built to the JEDEC UFS standard specification. JEDEC is a registered trademark of JEDEC Solid State Technology Association.
[2] Product density is identified based on the density of memory chip(s) within the Product, not the amount of memory capacity available for data storage by the end user. Consumer-usable capacity will be less due to overhead data areas, formatting, bad blocks, and other constraints, and may also vary based on the host device and application. For details, please refer to applicable product specifications. The definition of 1Gb = 2^30 bits = 1,073,741,824 bits. The definition of 1GB = 2^30 bytes = 1,073,741,824 bytes.
[3] Embedded MultiMediaCard. e-MMC is a product category for a class of embedded memory products built to the JEDEC e-MMC Standard specification.
[4] MIPI Alliance Specification for M-PHY. MIPI® and M-PHY® are registered trademarks owned by MIPI Alliance.
[5] Performance comparison is based on e-MMC v5.1 and UFS v4.0 JEDEC specifications. Read and write speed may vary depending on the host device, read and write conditions, and file size.
[6] Source: Forward Insights Sep 2022. $13.4B includes UFS and uMCP.