



## Product Brief

### Universal Flash Storage (UFS)

Designed to be the next-generation, higher performance embedded storage solution to e-MMC, KIOXIA's UFS (Universal Flash Storage) brings the high-speed read/write performance and low power consumption demanded by mobile devices and related applications.

KIOXIA's UFS solution is available in JEDEC/UFS Version 2.1/3.1/4.0 and integrates the company's BiCS FLASH™ 3D flash memory and controller in a JEDEC standard package. The latest controller supports the highest UFS interface speed today (46.4Gbps), enhanced error correction, wear leveling, logical to physical address translation, and bad-block management for a simplified system development.

KIOXIA was first company to sample the UFS technology and will continue to lead the way forward for the applications of the future. With UFS from KIOXIA, an improved user experience becomes reality.



#### Advantages

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

\*When compared to e-MMC.

#### Key Features

- KIOXIA controller
- Serial interface
- High speed reads/writes
- Low pin count
- 32GB-1TB
- BiCS FLASH™ 3D memory
- 11.5x13mm and 11x13mm BGA packages
- JEDEC standard

#### Applications

- Smartphones
- AR/VR
- Tablets/2in1
- Streaming Media
- Smart Speakers
- Many others

#### Densities

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

#### Design Considerations

UFS v4.0  supports **4640MB/s**

UFS v3.1  supports **2320MB/s**

e-MMC v5.1  supports **400MB/s**

##### 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

\*Please see part number table for currently available densities.

##### Use e-MMC When:

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

Product image may differ from the actual product.



# UFS | Universal Flash Storage

	Part Number	Capacity	UFS Version	Max Data Rate (MB/s)	Supply Voltage			Operating Temp °C	Package (mm)
					V <sub>cc</sub> (V)	V <sub>ccq</sub> (V)	V <sub>ccq2</sub> (V)		
Consumer Grade	THGAF8G8T23BAIL	32 GB	2.1	1,160	2.7 to 3.6	_ <sup>1</sup>	1.70 to 1.95	-25 to 85	11.5 x 13.0 x 0.8
	THGAF8G9T43BAIR	64 GB							11.5 x 13.0 x 1.0
	THGJFAT0T44BAIL	128 GB	3.1	2,320	2.4 to 2.7 2.7 to 3.6	1.14 to 1.26	_ <sup>2</sup>	-25 to 85	11.5 x 13.0 x 0.8
	THGJFAT1T84BAIR	256 GB							11.5 x 13.0 x 1.0
	THGJFGT1E45BAIP	256 GB							11.0 x 13.0 x 0.8
	THGJFAT2T84BAIR	512 GB							11.5 x 13.0 x 1.0
	THGJFGT2T85BAIU	512 GB							11.0 x 13.0 x 1.0
	THGJFHT3T84BAIG	1 TB							11.5 x 13.0 x 1.2
	THGJFJT0E25BAIP	128 GB	4.0	4,640	2.4 to 2.7	1.14 to 1.26	_ <sup>2</sup>	-25 to 85	11.0 x 13.0 x 0.8
	THGJFJT1E45BATP	256 GB							11.0 x 13.0 x 0.8
THGJFJT2T85BAT0	512 GB	11.0 x 13.0 x 0.95							

(1) Dual-supply operation at V<sub>cc</sub> and V<sub>ccq2</sub>. V<sub>ccq</sub> need not be supplied. (2) Dual-supply operation at V<sub>cc</sub> and V<sub>ccq</sub>. V<sub>ccq2</sub> need not be supplied.

While UFS performance is higher Ver 4.0 > 3.1 > 2.1, the SoC will likely determine which version UFS is required. JEDEC intends each UFS version to be backward compatible with previous versions, but please confirm by evaluating the power supply voltage and SoC.

Universal Flash Storage (UFS) is a product category for a class of embedded memory products built to the JEDEC UFS standard specification. 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. The definition of 1GB = 2<sup>30</sup> bytes = 1,073,741,824 bytes.