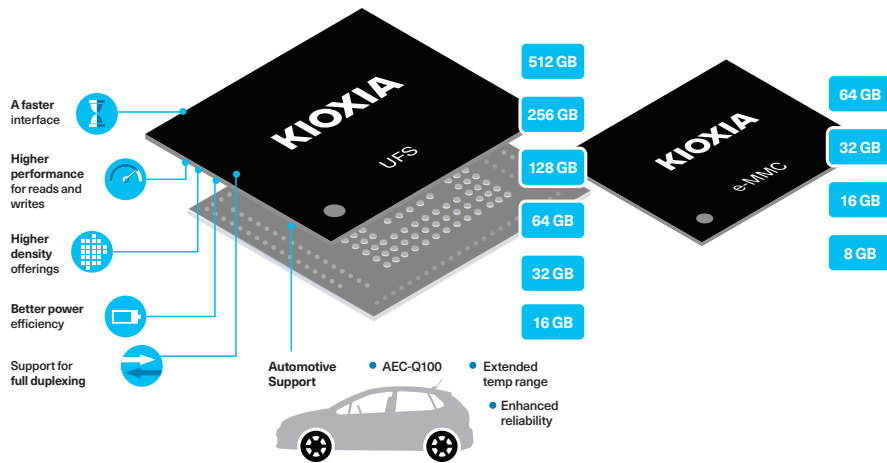


## Automotive Managed Flash Solutions

Universal Flash Storage (UFS) and e-MMC

### Automotive UFS

Our broad density lineup of high-speed UFS<sup>1</sup> memory for automotive applications is perfectly positioned to support the data storage demands of increasingly complex automotive applications. KIOXIA's Automotive UFS supports a wide temperature range (-40°C to +105°C), meets AEC-Q100 Grade 2<sup>2</sup> requirements and offers the extended reliability required by various automotive applications. Available capacities include 16 GB, 32 GB, 64 GB, 128 GB, 256 GB and 512 GB.

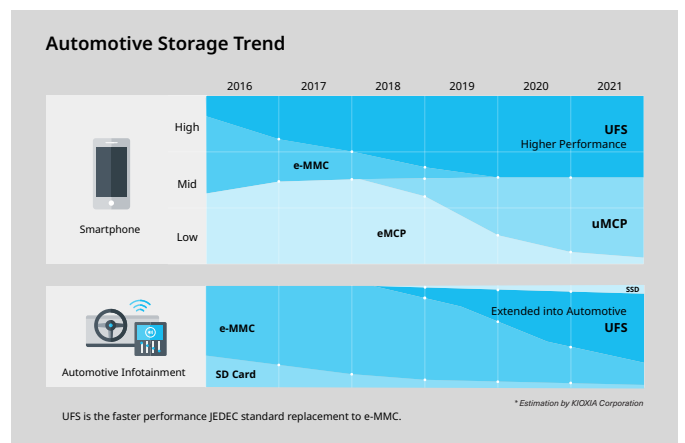


### Automotive e-MMC

As with KIOXIA's Automotive UFS, our Automotive e-MMC<sup>3</sup> supports a wide temperature range (up to 105°C), meets AEC-Q100 Grade 2<sup>2</sup> requirements, and features the enhanced reliability that automotive applications demand.

### Changing Lanes

UFS was specifically developed to be the high-performance replacement to e-MMC. It has become the dominant solution for smartphones and continues to migrate into automotive and other applications. UFS will ultimately surpass e-MMC as the dominant storage solution for automotive applications.



## Why UFS?

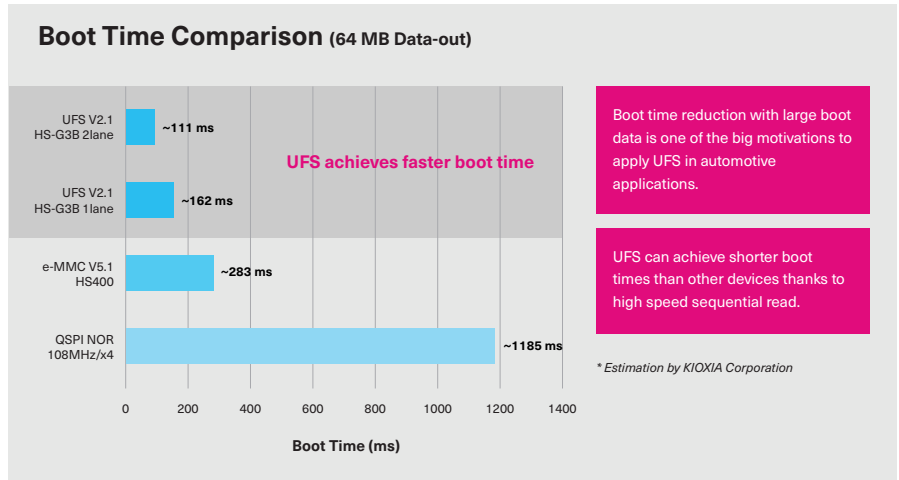
Simply put – it's the ideal successor to e-MMC. UFS performance will continue to advance, widening the already significant performance advantage it has over e-MMC.

### 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

### Additional features well-suited for automotive reliability

- Thermal Control: If the device exceeds 105°C, the device notifies the host processor to take action
- Better long term support in the market: UFS is now the main storage for the large mobile market, and is being adopted by automotive
- Extended Diagnosis: UFS controller monitors various items such as w/e cycles, current temperature, etc. and reports device status to the host processor



## Auto Requirements

- Meets Automotive standards (e.g., AEC-Q100 Stress Test Qual Standard)
- Supports PPAP (to ensure consistent production of quality parts)
- Extended Temperature Range (e.g., -40°C to +105°C)
- Low Failure Rate
- Extended Product Change Notices (PCNs)
- Longevity of Support
- Features ideal for Automotive (e.g., enhanced solder ball reliability, countermeasures if chip exceeds certain temp, etc.)

## Why KIOXIA?

KIOXIA has led the way in UFS since 2013, when we were the first to sample the technology, and will continue to pave the road forward for the automotive applications of the future.

## Automotive e-MMC | AEC-Q100 Grade 2

Datasheets Available Upon Request

Part Number	Capacity	e-MMC Version	Max Data Rate (MB/s)	Supply Voltage		Operating Temp (°C)	Package (mm)
				V <sub>cc</sub> (V)	V <sub>ccq</sub> (V)		
THGBMJG6C1LBAB7	8 GB	5.1	400	2.7 to 3.6	1.70 to 1.95, 2.7 to 3.6	-40 to 105 <sup>6</sup>	11.5 x 13.0 x 1.0
THGBMJG7C2LBAB8	16 GB						11.5 x 13.0 x 1.2
THGBMJG8C4LBAB8	32 GB						
THGBMJG9C8LBAB8	64 GB						

## Automotive UFS | AEC-Q100 Grade 2

Datasheets Available Upon Request

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)		
THGAF9G7L1LBAB7 <sup>1</sup>	16 GB	2.1	1166	2.7 to 3.6	_ <sup>7</sup>	1.70 to 1.95	-40 to 105 <sup>6</sup>	11.5 x 13.0 x 1.0
THGAFBG8T13BAB7	32 GB							11.5 x 13.0 x 1.2
THGAFEG8T13BAB7 <sup>4</sup>	64 GB							
THGAFBG9T23BAB8	128 GB							11.5 x 13.0 x 1.2
THGAFEG9T23BAB8 <sup>4</sup>	256 GB							
THGAFBT0T43BAB8	512 GB							
THGAFET0T43BAB8 <sup>4</sup>	11.5 x 13 x 1.3							14.0 x 18.0 x 1.2
THGAFBT1T83BAB5	11.5 x 13 x 1.3							
THGAFET1T83BAB5 <sup>4</sup>	14.0 x 18.0 x 1.2							

<sup>1</sup> Universal Flash Storage (UFS) is a product category for a class of embedded memory products built to the JEDEC UFS standard specification.

<sup>2</sup> Electrical component qualification requirements defined by the AEC (Automotive Electronics Council).

<sup>3</sup> e-MMC is a product category for a class of embedded memory products built to the JEDEC e-MMC Standard specification.

<sup>4</sup> Maximum pre-load capacity is 100% of the user area capacity.

<sup>5</sup> New product. Sample specifications may differ from mass production parts.

<sup>6</sup> T<sub>c</sub>=115°C max.

<sup>7</sup> This product supports dual-supply operation at VCC and VCCQ2. VCCQ need not be supplied.

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.

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