Automotive Managed Flash Solutions

Universal Flash Storage (UFS) and e-MMC

Automotive UFS

Our broad density lineup of high-speed UFS 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 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 supports a wide temperature range (up to 105°C), meets AEC-Q100 Grade 2 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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Capacity</th>
<th>e-MMC Version</th>
<th>Max Data Rate (MB/s)</th>
<th>Supply Voltage</th>
<th>Operating Temp (°C)</th>
<th>Package (mm)</th>
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<tbody>
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<td>2.7 to 3.6</td>
<td>-40 to 105°</td>
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Datasheets Available Upon Request

### Automotive UFS | AEC-Q100 Grade 2

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<th>UFS Version</th>
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<th>Supply Voltage</th>
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Datasheets Available Upon Request

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1. Universal Flash Storage (UFS) is a product category for a class of embedded memory products built to the JEDEC UFS standard specification.
2. Electrical component qualification requirements defined by the AEC (Automotive Electronics Council).
3. e-MMC is a product category for a class of embedded memory products built to the JEDEC e-MMC Standard specification.
4. Maximum pre-load capacity is 100% of the user area capacity.
5. New product. Sample specifications may differ from mass production parts.
6. Tc=115°C max.
7. 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 = 2³⁰ bytes = 1,073,741,824 bytes.