Automotive-Grade UFS and e.MMC Embedded Flash Drives

The Storage You Can Drive On

Designed for the connected and autonomous car market, Western Digital's automotive-grade iNAND® UFS and e.MMC Embedded Flash Drives (EFDs) deliver high-performance and high-reliability storage for a variety of demanding automotive applications. The devices address the evolving needs of traditional applications such as infotainment and vehicle navigation systems, and next generation applications such as Vehicle-to-Vehicle/Infrastructure communications, telematics gateways, digital cluster, drive recorders, and autonomous driving.

Smart partitioning, a sophisticated read refresh algorithm, power fail immunity, and an LDPC ECC engine are just a few of the features that make these some of the most advanced EFDs on the market. With additional industry-leading features including automotive-optimized 3D technology, iNAND SmartSLC™, and deep diagnostics, Western Digital iNAND automotive-grade e.MMC and UFS EFDs empower your data-driven applications.


Western Digital.
iNAND EM122
Automotive XA
AT e.MMC
64GB
Western Digital.
iNAND EM132
Automotive XA
AT e.MMC
256GB
Western Digital.
iNAND EU312
Automotive XA
AT UFS
256GB
Western Digital.
iNAND EU312
Automotive ZA
AT UFS
256GB
Western Digital.
iNAND EM132
Automotive ZA
AT e.MMC
256GB
Western Digital.
iNAND EM122
Automotive ZA
AT e.MMC
64GB

Advanced Features

3D Technology*

- Higher performance, lower cost and lower power consumption
- Larger effective cell size and less cell-to-cell interference
- Higher reliability margins when compared to 2D NAND with similar bit density

SmartSLC™*

Western Digital's iNAND automotive-grade e.MMC and UFS products feature industry-leading SmartSLC, designed to boost host write performance and leverage the benefits of SLC to maximize device throughput and endurance.

Adaptive mechanisms ensure writes are routed through SLC blocks for superior write speeds and efficiently migrate data to TLC to ensure performance consistency.

Advantages:

Performance:

- Boost sequential and random write performance to SLC level
- SLC-grade latency for better write-driven use cases
- Maintain high performance when media is fragmented
- Persistent performance even when media is full

Endurance:

- Reduce host writes to the TLC area
- Reduces Write Amplification Factor (WAF) to the TLC area
- Increase product endurance and longevity (TBW)

Robustness:

- Leverage SLC's higher resiliency to data corruption
- TLC/SLC redundancy increases power failure handling

*Note: Applicable for AT EM132 and AT EU312

Advanced Features

Advanced Device Report

iNAND products offer a proprietary device report feature with detailed information and diagnostics on the firmware and device status at runtime. This information provides a deeper EFD status understanding, on top of the e.MMC and UFS JEDEC specs in an easy-to-use method including:

- Wear-leveling areas and device health
- Voltage droop and occurrences
- Power diagnostics
- Lifetime prediction
- Firmware release and update
- Host read and write
- Error detection and correction
- Temperature
- Failures and recovery

Smart Partitioning

iNAND automotive-grade e.MMC and UFS Smart Partitioning implementation creates dedicated, physically separated and individually managed memory areas. This protects specific partitions from the unwanted effects of overuse as well as preventing any impact to the data integrity caused by activities in other areas, thus helping to maximize endurance, data retention and separation.

Separate areas may include:

- TLC/MLC based User Area
- SLC based High Data Retention / Read Intensive / Secured area
- SLC based High Endurance area, tailored for write-intensive applications

Auto/Manual Read Refresh

A sophisticated automatic read refresh algorithm is implemented in the iNAND automotive-grade e.MMC and UFS devices to offer better handling of data retention, read disturb and read refresh. It senses early signs of block degradation and automatically refreshes the data. The algorithm includes multiple types of scans designed to identify affected pages with high Bit Error Rate (BER).

In addition, the host can initiate Refresh via command, which is proprietary in iNAND automotive-grade e.MMC and according to JEDEC UFS3.0 in iNAND automotive-grade UFS.

Advanced Features

Power Immunity

iNAND automotive-grade e.MMC and UFS devices implement advanced mechanisms for protecting the device and the user data from data loss, data corruption or device damage due to external power failures. This addresses the occurrence of both write abort and voltage droop.

100% Content Preloading and Integrity Post IR Reflow

iNAND automotive-grade e.MMC and UFS are designed to support 100% content preloading (via external programmer) pre-IR reflow and guarantee high data integrity post-IR reflow. This assures that the high temperature experienced during the IR-reflow process does not affect the data integrity of the preloaded data.

Thermal Management

To prevent the damage to the NAND or controller while operating in high temperatures, the iNAND automotive-grade e.MMC and UFS implement a robust thermal management mechanism. This mechanism is activated by default and automatically adjusts the internal power mode to ensure protection from overheating. In addition, the iNAND automotive-grade UFS device supports Temperature Event Notification-a JEDEC UFS3.0 parameter.

Suited for Automotive Applications

iNAND automotive-grade e.MMC and UFS devices undergo rigorous qualification and production testing, and comply with automotive standards such as AEC-Q100 and are qualified to meet and exceed the standard requirements.

Fast Boot

iNAND automotive-grade e.MMC and UFS devices enable the host to boot from boot partitions/LUs of the device. This feature allows the system to be functional at the proper time. For example, the console display and the remaining car system functionality are needed the moment the driver enters or activates the vehicle. In addition, this feature enables the replacement of SPI NOR for the inherent capability of the iNAND device, reducing BOM costs and board space.

Automotive iNAND® Embedded Flash Devices

	iNAND AT EU312 Grade 3	iNAND AT EU312 Grade 2	iNAND AT EM132 Grade 3	iNAND AT EM132 Grade 2	iNAND AT EM122 Grade 3	iNAND AT EM122 Grade 2
Capacity (TB)	16GB – 256GB	16GB – 256GB	32GB to 256GB	32GB to 256GB	8GB to 64GB	8GB to 64GB
Interface	UFS 2.1		e.MMC 5.1 HS400			
Operating Temperature	–40°C to 85°C	–40°C to 105°C	–40°C to 85°C	–40°C to 105°C	–40°C to 85°C	–40°C to 105°C
Sequential R/W (MB/s)	Up to 800/550		Up to 310/250		Up to 300/125	
Random R/W (MB/s)	Up to 35K/40K		Up to 20K/12K		Up to 22K/12K	
Enhanced Features	Advanced Health Report, Smart Partitioning, Auto and Manual Refresh, UFS 3.0 automotive features included		Advanced Health Report, Auto and Manual Refresh, Smart Partitioning, Thermal Management		Advanced Health Report, Auto and Manual Refresh, Smart Partitioning, Thermal Management	
Package	11.5×13×1.2mm		11.5×13×1.0mm, 11.5×13×1.2mm		11.5×13×0.8mm, 11.5×13×1.0mm, 11.5×13×1.2mm	
Ordering Information	SDINDDH6-###G-XA	SDINDDH6-###G-ZA	SDINBDA6-###G-XA1	SDINBDA6-###G-ZA1	SDINBDG4-###G-XA2	SDINBDG4-###G-ZA2
Formerly Known As	iNAND® 8250A		iNAND® 7550A		iNAND® 7250A	

Note: One gigabyte (GB) is equal to one billion bytes. Actual user capacity may be less due to operating environment.

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