eMMC NANDrive™ and Industrial SD Cards in Embedded Systems

Why Do Systems Use SD Cards?

Secure Digital (SD) memory cards have been widely used since their introduction in 1999 for mass data storage in various consumer devices. The small size and low power consumption of SD cards make them ideal for smart phones, digital cameras, drones, tablet computers and GPS devices. Many embedded industrial designers may seek to take advantage of the wide availability of SD cards if they prefer their storage to be removable. However, the need for an SD connector and the potential mechanical reliability considerations can be problematic. The removable aspect of SD cards may be useful for some applications, but they are not suitable for storing sensitive data if the device can be easily removed by an unauthorized user, or for use in embedded systems deployed in high vibration and shock environments.

NANDrive™ and SD Card Differences

As the size of embedded systems continues to shrink, there is a need for even more compact form factor storage than offered by SD cards. Being physically smaller than an SD card, industrial temperature NANDrive solid state drives (SSDs) are an ideal solution. No extra connectors are needed because NANDrive is soldered directly onto the printed circuit board (PCB), making it resistant to shock and vibration. In addition, no host software changes are required if standard drivers and protocols are used.

For embedded applications that require high reliability, performance and security, eMMC NANDrive offers additional built-in advanced features that cannot be found in today's SD cards, such as a dedicated pin (WP#) for write protection, secure erase and TRIM support. SD cards also lack advanced power interrupt data protection, which is a standard feature of eMMC NANDrive. The table on the next page includes key product specifications comparing industrial SD cards and eMMC NANDrive SSDs.

Implementation Considerations

The SD command interface is similar to the eMMC interface, but has additional commands related to copy protection. Most standard driver implementations initially use only those commands supported by both standards for the initialization and identification process. After it is clear whether there is an SD or eMMC type device on the host bus, the correct protocols should be employed so most systems will be able to accommodate both SD and eMMC devices.

Typical Design Using eMMC NANDrive

www.NANDrive.com
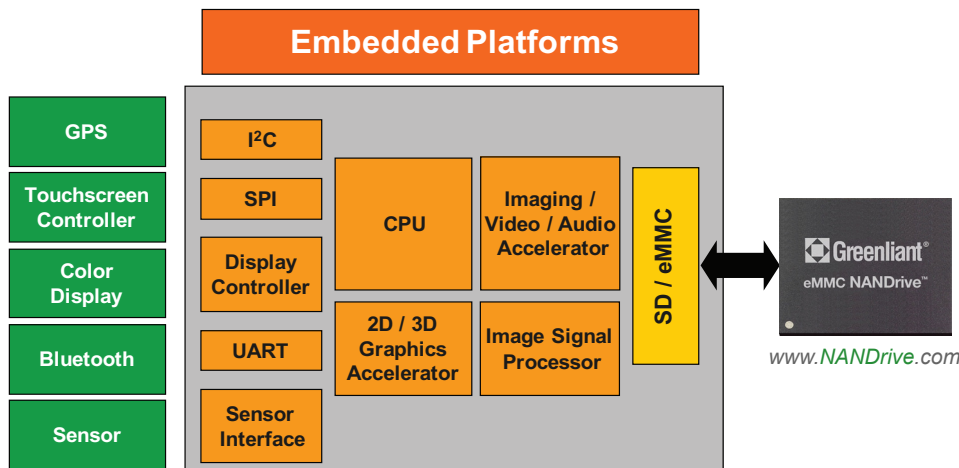
Applications

— *In-vehicle infotainment*
— *GPS and telematics*
— *Data recorder*
— *Video conferencing*
— *Tablet PC*
— *Multi-function printer*
— *Point-of-Sale terminal*
— *VoIP system / PBX*
— *Wireless base station*
— *Router / Gateway / Switch*
— *Set-top box*
— *Industrial PC / Single-board computer*
— *Ultrasound and medical imaging*
— *Industrial automation and control*
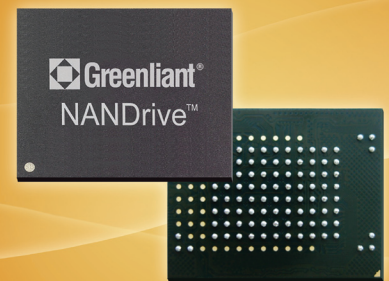— *Test and measurement equipment*
— *Video surveillance / ID terminal*

Greenliant Systems
3970 Freedom Circle, Suite 100
Santa Clara, CA 95054 USA
Tel. 1-408-200-8000
Fax 1-408-200-8099

www.Greenliant.com

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eMMC NANDrive Compared to Industrial SD Cards			
Category	Characteristic	eMMC NANDrive	Industrial SD Cards
Feature	Capacity	512 MB to 64 GB	128 MB to 128 GB
	Host Interface	eMMC	SD
	Power Consumption	Sleep mode: Up to 300 µA (typical)	Sleep mode: Up to 300 µA (typical)
	Power Management	Zero wake-up latency without host intervention	N/A
Performance	Sequential Read	Up to 185 MB/s	Up to 95 MB/s
	Sequential Write	Up to 140 MB/s	Up to 90 MB/s
Form Factor	Operating Temperature	-40°C to +85°C (Industrial)	-40°C to +85°C (Industrial)
	Package	14mm x 18mm x 1.40mm (100b) 11.5mm x 13mm x 1.35mm (153b)	32mm x 24mm x 2.10mm

The eMMC NANDrive family of embedded SSDs integrate Greenliant's advanced eMMC controller with one or more NAND flash die in a multi-chip package. eMMC NANDrive is available with 2-bits-per-cell (MLC) or 1-bit-per-cell (SLC) NAND to meet various customer requirements for lifespan, endurance and performance. Ideal for automotive, industrial, medical, security and networking applications, these high-reliability SSDs are offered in both 100-ball and 153-ball packages.

A built-in microcontroller and flash file management firmware replace the need for host-side Flash File System (FFS). eMMC NANDrive is compatible with many NXP/Freescale, NVIDIA, TI, Intel, Qualcomm, AMD and other popular chipsets. It operates at full industrial temperatures between -40 and +85 degrees Celsius, giving customers data storage that can withstand the most severe conditions. Available in various capacities, these space-saving products are designed with enhanced data integrity and security features.

Greenliant®
NANDrive™

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