

# CAST

## NANDFLASH-CTRL Driver

### NAND Flash Memory Controller Core Software Driver

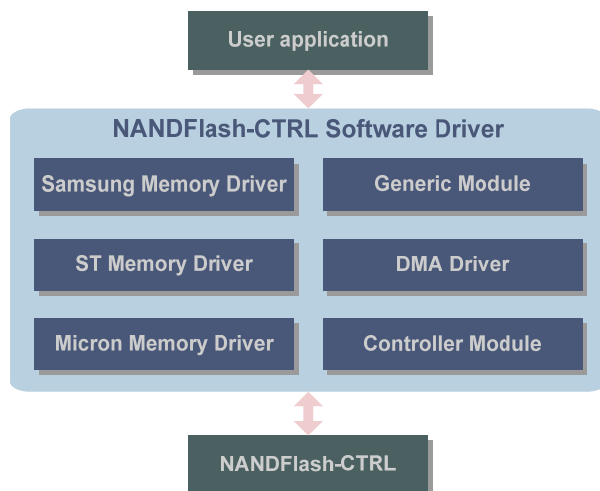
The NANDFLASH-CTRL Driver provides the functionality of the CAST NAND Flash Controller IP core to the user's application system.

The driver supports a wide range of functions related to NAND Flash memories, including Program Memory Page, Read Memory Page, and Erase Memory Block. Three sets of functions are included, covering the primary manufacturers: ST, Samsung, and Micron. The driver supports additional NAND Flash controller functions like DMA transmission, hardware mapping of memory blocks, and selecting memory read-only area.

#### Applications

- Mass Storage
  - USB flash drives
  - Digital cameras
  - Digital voice recorders
- Embedded Storage
  - Cellular phones
  - Network routers
  - Point of sale systems

#### Block Diagram



#### Features

- Dedicated modules to support memories by Micron, STMicroelectronics and Samsung
- Written in ANSI C
- Support for a DMA controller
- Automatic, manual, or random access to data on memory page
- Memory reset function
- **Benefits**
  - Includes native support for memories from the most popular vendors
  - CPU independent for broad applicability
  - Facilitates RTOS application development
  - Includes various configurable options to yield a minimum resource footprint
  - Offers straightforward integration with the CAST NAND Flash Controller Core

## Functional Description

The NANDFLASH-CTRL Software Driver core is partitioned into modules as shown on the block diagram and described below.

### Samsung Memory Driver

Implements functions controlling Samsung NAND Flash memories, including simultaneous operations on two pages/blocks located on different memory planes, page programming (automating and manual), and block erasing.

### ST Memory Driver

Conforms to the STMicroelectronics memory specification, enabling page reading in cache mode (automatic and manual) and supporting block write protection.

### Micron Memory Driver

Implements Micron-specific functions including page reading in cache mode (automatic and manual), access to the OTP memory area, and simultaneous operations on two pages/blocks located on different memory planes.

### Generic Module

Handles both writing and reading data to and from the memory page. Can be set to automatic, manual, or random mode. Erasing block memories, copying pages within memory, reading memory ID, and memory status functions are also available.

### DMA Driver

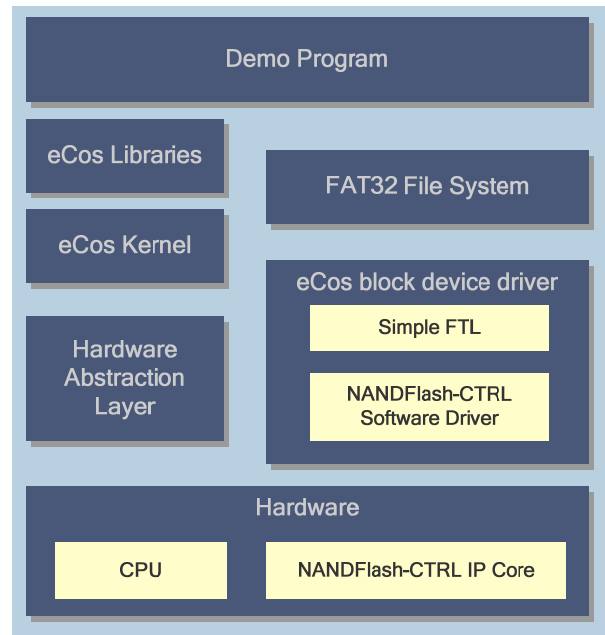
Handles DMA configuration and data transfer functions.

### Controller Module

Initializes the NAND Flash Controller and selects active flash memory. Enables users to set a write-protect area, set memory to read-only mode, or configure the controller's timing settings. Built-in memory block hardware mapping enables a corrupted block management mechanism.

## Example Application

This example application uses the FAT32 file system with a NAND Flash memory chip. The FAT32 file system is one of the eCos Real Time Operating System (RTOS) packages. During system initialization, the NAND Flash controller and NAND Flash memory are initialized. The eCos block device driver then checks for a partition table in the NAND Flash memory, and creates one if necessary. The application exercises several operations on the FAT32 file system, mounting the device, creating files, copying and comparing files, creating directories, listing directory contents, and deleting files and directories. It then prints the results of all operations through a UART interface.



## Configurability

The configurability features implemented in the NANDFLASH-CTRL Software Driver enable a minimum resource footprint. The most common options are:

- Support for the following components:
  - ST memories
  - Samsung memories
  - Micron memories
  - DMA controller
- NAND Flash memory page size
- NAND Flash memory address cycles count
- Enable / disable hardware ECC module

## Standard Deliverables

- ANSI C source code for all modules
- User manual
- Example project created in Tasking or GNU environment

## Related Products

CAST NAND Flash Controller – NAND Flash Memory Controller that supports both SLC and MLC memories. Includes implementation of the Open Core Protocol (OCP) interface and Open NAND Flash Interface (ONFI) as well as built-in support for memories from various vendors make the IP core applicable in a wide variety of NAND Flash applications.