SafeFLASH NOR Driver for Micron M29W128G User Guide

Version 1.20

For use with SafeFLASH NOR Driver for Micron® M29W128G versions 1.01 and above

Date: 31-Aug-2017 13:58

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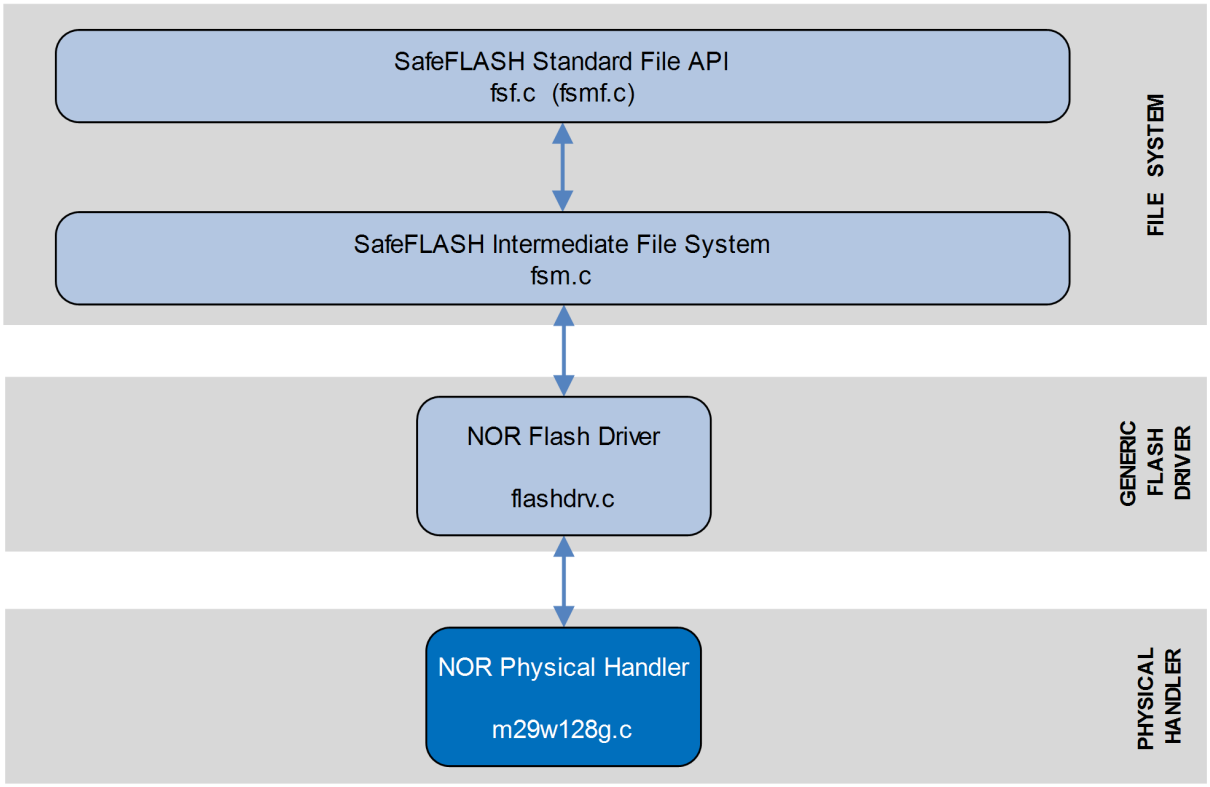
1 System Overview

1.1 Introduction

This guide is for those who want to implement a SafeFLASH NOR driver for the Micron® M29W128G and similar devices from Micron Technology Inc. This is for use with HCC's SafeFLASH file system.

The following diagram shows the structure of the file system software:



This diagram shows:

- The main SafeFLASH package – this provides the file API and intermediate file system. This is described in the *HCC SafeFLASH File System User Guide*.
- The NOR flash driver – the generic device driver for NOR flash, provided by the base NOR package. This driver handles issues of FAT maintenance, wear leveling, and so on. It is described in the *HCC SafeFLASH File System NOR Drive User Guide*.
- The NOR physical handler – provided by this module, this performs the translation between the driver and the physical flash hardware.

Note: HCC Embedded offers hardware and firmware development consultancy to assist developers with the implementation of flash file systems.

1.2 Feature Check

The main features of the module are the following:

- Conforms to the HCC Advanced Embedded Framework.
- Designed for integration with both RTOS and non-RTOS based systems.
- Supports Micron® M29W128G flash and is easily configurable for similar NOR flash parts.
- Supports static and dynamic wear leveling.
- Provides bad block management.
- A sample driver is available with a porting description.

1.3 Device Compatibility

This driver supports two device types. This table summarizes their properties

	M29W128GL	M29W128GH
Block size	128K	128K
Number of blocks	128	128
Write-protectable block (via Vpp)	The lowest address block.	The highest addressable block.
Device ID (see Configuration Options)	0x227e, 0x2221, 0x2200	0x227e, 0x2221, 0x2201
Erase suspend supported	Yes	Yes
Program suspend supported	Yes	Yes
Common Flash Interface (CFI) supported	Yes	Yes

The driver is easily portable to other M29W series flash parts.

1.4 Fail-safety

This driver for M29W128G NOR flash is designed as part of HCC's SafeFLASH file system. SafeFLASH guarantees a defined level of fail-safety (see the *SafeFLASH File System User Guide*). For the system to be able to guarantee fail-safety, each component must provide a defined quality of service.

For this driver the following must be guaranteed to ensure the system is fail-safe:

- All write operations must be committed to flash in the sequence in which they are provided to the driver.
- Any write operation that fails must return an error.
- Any erase operation that fails must return an error.
- The system must ensure that there is at most one partially complete write or erase operation. At this point the file system should be restarted so that it can be recovered.

To achieve this in practice, the target hardware should ensure that in the event of a falling voltage the system resets or signals when the level approaches the specified programming level of the flash chip and inhibits further flash access.

There are other ways to manage this, for instance by adding a capacitance to ensure power is still available to complete an operation after a hardware error or reset condition is detected.

By using these techniques, the system can guarantee correct operation even after an unexpected system reset.

1.5 Packages and Documents

Packages

The table below lists the packages that you need in order to use this module:

Package	Description
hcc_base_doc	This contains the two guides that will help you get started.
fs_safe_nor	The SafeFLASH NOR flash driver.
fs_safe_nor_drv_m29w128g	The low level driver package described in this document.

Documents

For an overview of HCC file systems and guidance on choosing a file system, see Product Information on the main HCC website.

Readers should note the points in the HCC Documentation Guidelines on the HCC documentation website.

HCC Firmware Quick Start Guide

This document describes how to install packages provided by HCC in the target development environment. Also follow the *Quick Start Guide* when HCC provides package updates.

HCC Source Tree Guide

This document describes the HCC source tree. It gives an overview of the system to make clear the logic behind its organization.

HCC SafeFLASH File System User Guide

This document describes the base SafeFLASH System.

HCC SafeFLASH File System NOR Drive User Guide

This document describes the SafeFLASH NOR generic driver.

HCC SafeFLASH NOR Driver for M29W128G User Guide

This is this document.

1.6 Change History

This section describes past changes to this manual.

- To view or download earlier manuals, see Archive: SafeFLASH NOR Driver for M29W128G User Guide.
- For the history of changes made to the package code itself, see History: fs_safe_nor_drv_m29w128g .

The current version of this manual is 1.20. The full list of versions is as follows:

Manual version	Date	Software version	Reason for change
1.20	2017-08-31	1.01	Corrected *Packages* list.
1.10	2017-06-26	1.01	New *Change History* format.
1.00	2017-04-24	1.01	First online version.

2 Source File List

The following sections describe all the source code files included in the system. These files follow the HCC Embedded standard source tree system, described in the *HCC Source Tree Guide*. All references to file pathnames refer to locations within this standard source tree, not within the package you initially receive.

> **Note:** Do not modify any files except the configuration file and PSP files.

2.1 Configuration File

The file **src/config/config_safe_nor_m29w128g.h** contains the configurable system parameters. Configure these as required. This is the only file in the module that you should modify. For details of the options, see Configuration Options.

2.2 System Files

These files are in the directory **src/safe-flash/nor/phy/micron**. **These files should only be modified by HCC**.

File	Description
m29w128g.c	Driver source code.
m29w128g.h	Driver header file.

2.3 Platform Support Package (PSP) Files

These files in the directory **src/psp/target/micron** define the psp_m29w128g_hw_init() function that configures the hardware.

> **Note:** These are PSP implementations for the specific microcontroller and board; you may need to modify these to work with a different microcontroller and/or development board.

File	Description
psp_m29w128g_hw.c	Source code of low level initialization function.
psp_m29w128g_hw.h	Header file.

2.4 Version File

The file **src/version/ver_safe_nor_drv_m29w128g.h** contains the version number of this module. This version number is checked by all modules that use this module to ensure system consistency over upgrades.

3 Configuration Options

Set the system configuration options in the file **src/config/config_safe_nor_m29w128g.h**

NOR_MAN_ID

The identifier of the flash manufacturer. This is fixed at 0x20 for this device, representing Micron.

> **Note:** The following three options are device ID words that represent this device. Do not change the first two values unless you port this driver to support another similar chip.

NOR_DEV_ID

The default of 0x227E covers both the M29W128GL and M29W128GH.

NOR_DEV_ID2

The default of 0x2221 covers both the M29W128GL and M29W128GH.

NOR_DEV_ID3

Keep the default of 0x2200 for the M29W128GL. Change this to 0x2201 for the M29W128GH.

NOR_BLOCKSTART

The block start. Spaces before this are not used by the file system. The default is 0.

NOR_SECTORSIZE

The logical sector size. Set this to a value less than or equal to the block size (NOR_BLOCK_SIZE). The default is 4096.

NOR_DESCSIZE

The descriptor size. Set this to a value less than or equal to the block size (NOR_BLOCK_SIZE). The default is (16 * 1024).

NOR_CACHEDESCSIZE

The cache size. Set this to a value less than the descriptor size (NOR_DESCSIZE). The default is (4 * 1024).

NOR_BLOCK_SIZE

The block size. Set this to match the flash device used. The default is (128 * 1024).

NOR_NUM_BLOCKS

The number of blocks. Set this to match the flash device used. The default is 128.

4 PSP Porting

The Platform Support Package (PSP) is designed to hold all platform-specific functionality, either because it relies on specific features of a target system, or because this provides the most efficient or flexible solution for the developer.

The files **psp_m29w128g_hw.c** and **psp_m29w128g_hw.h** define the psp_m29w128g_hw_init() function that configures the hardware. Modify these files as required for your hardware.

4.1 psp_m29w128g_hw_init

Use this function to initialize the device.

Format

```
void psp_m29w128g_hw_init ( void )
```

Arguments

None.

Return Values

None.