

GRAPHICS CONTROLLERS

MB88F332

FLASHING THE DEVICE

APPLICATION NOTE

Revision History

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1 Introduction

This document describes the various access methods as well as their options to flash the MB88F332 device. Depending on the scope of the flash process (development or production) and the specific hardware situation (device is soldered or not, connection to other components etc.) a general recommendation is not possible. This document therefore covers the options the user has to flash the device in different stages of the manufacturing process instead. It additionally refers to further documents and possible contacts within the Fujitsu Group for further support.

2 The MB88F332 device and its internal flash

This chapter gives an overview of the 160Kbytes of internal flash

2.1 Features

Flash memory sector architecture: 2 x 64Kbyte sectors + 4 x 8 Kbyte

Flash memory program/erase endurance : 10,000 cycles

CPU Mode: Access to the flash via the AHB (external MCU, e.g. MB41F467 series):

Write : Sync mode (16 bit)

Read: Sync mode (32 bit)

Writer Mode: Access to the flash via an external interface (external programmer, e.g. GALEP)

Write: Async mode (8 bit / 16 bit)

Read: Async mode (8 bit / 16 bit)

For more details please refer to the Hardware Manual.

2.1.1 Limitations

The start margin from the falling edge of the FRSTX pulse to the completion of the reset operation is 20 μ s or more when the flash programmed using the automatic programming algorithm.

The FRSTX pulse width is 500ns or more.

The start margin from the rising edge of FRSTX to read mode is 200ns or more.

2.2 Operating Modes

The MB88F332 device can be set to several modes, one is the normal operation mode.

This is done via hardware and using specific mode pins. In normal mode, the internal flash is accessible via two different external sources.

First it can be done via the APIX interface as long as the sideband channels are used and a corresponding MCU/CPU with an AShell implementation is available. This implementation is required to make sure that the commands from the source (MCU) are converted to the data format that the target (MB88F332) can handle.

As a second option, the MB88F332 can be accessed via the so-called HOST Interface. It is an SPI-based interface that makes it possible to build systems without APIX too. Also it is required to implement a protocol on the source side that can be understood by the MB88F332.

Fujitsu offers already software solutions for the HOST Interface access method. For access via APIX, a solution is currently under development.

Both access methods are limited in terms of performance because the available bandwidth over APIX as well as over the HOST Interface is smaller compared to typical parallel access (in the factory).

To increase the performance, a parallel mode for programming the flash is also possible. In this case, the MB88F332 needs to run in a dedicated 'program' mode (selectable via hardware configuration pins too). At this point, it is important whether the chip is already soldered or not. It might not be possible to run the "program" mode if certain pins are already used by peripherals or some other influences from external components prevent the use of this mode.

2.3 Available options for flashing

2.3.1 Fujitsu pre-programmed

Fujitsu can offer to deliver pre-programmed and tested MB88F332 devices to the customer. This is an additional service provided by Fujitsu. In this case, the customer must provide the flash contents. In the production process the content will be flashed into the chip. A process flow and schedule as well as specification documents are available and would need to be agreed and exchanged between the customer and Fujitsu. More information about this option is available via the local sales team (check the Internet website for your contact).

2.3.2 3rd Party external flash devices (unsoldered MB88F332)

An empty MB88F332 device can be programmed via the parallel interface in “program” mode using an external flashing device. This may require a specific adaptor board suitable for the MB88F332 208LQFP package. Documentation for setup and programming in this configuration is also available via the homepage as well as the following link: <http://www.fujitsu.com/downloads/MICRO/fme/displaycontrollers/an-mb88f332-flash-parallel-spec-rev1-0.pdf>

Fujitsu can also support customers in this case by putting them in contact with suitable 3rd party companies that are familiar with Fujitsu products.

2.3.3 Already soldered, empty MB88F332 devices

If the MB88F332 is already soldered to a given PCB then at least 2 sub options are possible:

- A) If the layout of the PCB allows the use of the 'program' mode in parallel to the normal operation mode, then the device may be programmed with the help of an external programming device too. Please make sure that the external programming device has correct physical access (e.g. needle adaptor) and that the programmer itself is using programming procedures that correspond to the Fujitsu specification, please see the Application Note (Flash Memory Parallel Writer Specification) (29 pages, 445KB)
<http://www.fujitsu.com/emea/services/microelectronics/gdc/gdcdevices/mb88f332-indigo.html#support>
- B) If the layout permits the use of the 'program' mode in its soldered configuration, access is always possible via the HOST Interface. Additionally - and depending on the system configuration - the APIX link is also an option to program the internal flash.

2.3.3.1 Flashing via the HOST Interface (development)

For access to MB88F332 devices, Fujitsu offers a development software tool called 'GDC-Studio'. This Windows-based development tool also includes an option for R/W access to the internal flash including an 'erase' operation as well as sectorwise access and complete reflashing. For further details, please see:

<http://www.fujitsu.com/emea/services/microelectronics/gdc/swtools/gdc-studio.html>. In addition, a free stand-alone flash tool is available, based on the GDC studio software (see

<http://www.fujitsu.com/emea/services/microelectronics/gdc/swtools/gdc-flasher.html>). Due to the scope of the development environment, it is not recommended to use these tools for purposes other than the intended task.

2.3.3.2 Flashing via the HOST Interface (non-development)

For non-development purposes such as production lines, the requirements vary too much from design to design and between the corresponding development tools so that a generic tool or application is not yet available from Fujitsu. Fujitsu can offer solutions as well but the availability would greatly depend on the requirements. However, it is also possible for the customer to develop independently hardware and software tools to accommodate for his specific needs. The protocol used for the HOST Interface is documented in the MB88F332 Hardware Manual. In addition, schematics of the reference boards are available too: (<http://www.fujitsu.com/emea/services/microelectronics/gdc/evalbds/indigo-evalboard.html>) . Please keep in mind that this access method may be limited in terms of performance depending on the amount of data that needs to be flashed.

2.3.3.3 Flashing via the APIX Interface

The APIX interface includes so-called sideband communication. This allows an application to control internal MB88F332 modules. It is important to distinguish between the different operating modes of the APIX interface and to closely examine the given configuration (Application Note (APIX Automotive Shell SW-Emulation) (26 pages, 222 KB), <http://www.fujitsu.com/emea/services/microelectronics/gdc/gdcdevices/mb88f332-indigo.html#support>

Depending on the individual circumstances of the currently being used hardware platform and requirements given by the software, it can be possible to access the internal flash via APIX link too. As long as the MB88F332 uses the default APIX configuration it is possible to program the internal flash via the APIX link. As soon as a command sequence is used to alter the default APIX configuration after reset it may not be possible anymore to establish a connection in order to reprogram the internal flash via APIX. Fujitsu offers a software solution to program any Indigo ECU via the APIX link interface. The details of this solution are described in the APIX Flash Programmer Concept document which can be requested separately. For requests and offers please contact the local sales team.