



ABSTRACT

Flash part selection is an important step for designing with AM261x microcontrollers. There are multiple factors to consider when selecting a compatible flash memory. This document covers the basic requirements that a specific flash memory must support to be compatible with an AM261x device during both boot operation and application execution.

Table of Contents

1 Introduction.....	1
2 Acronyms Used in This Document.....	3
3 ROM Boot Requirements.....	3
4 Application Requirements.....	3
5 Additional Usage Factors.....	4
6 Flash Support in MCU PLUS SDK.....	4
7 Boot Compatible Flash Devices.....	4
8 Tested Flash Devices.....	4
9 Related Documentation From Texas Instruments.....	5
10 Revision History.....	5

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1 Introduction

Flash memory can be utilized two different ways in the user system:

- Memory is used as boot media; the application image is stored in the flash memory and used as bootloader source.
- Memory is used as a storage media during application.

When picking a flash memory IC, the device must comply with all boot requirements of the system-on-chip (SoC). If the memory is used as boot media, some guidelines must be followed to work efficiently as a storage device during application.

Figure 1-1 depicts the flash memory organization once the secondary bootloader (SBL) image and valid application image are present.

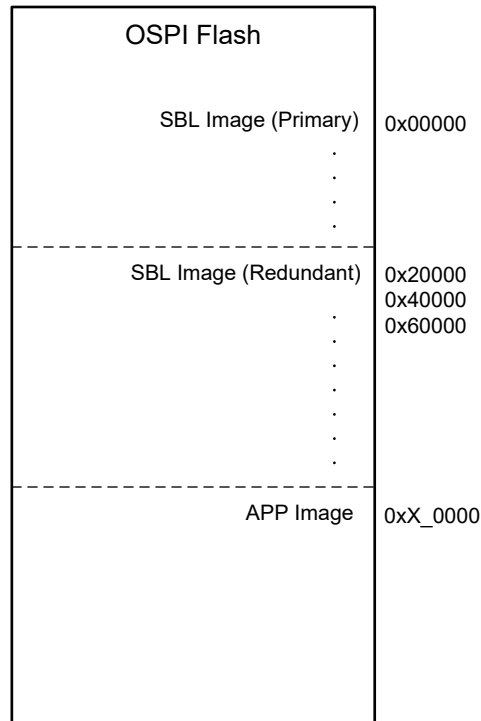


Figure 1-1. OSPI Flash Memory Map

Note

The flash region can be utilized starting at "0x0_0000 + SBL Size Image" to 0xE_FFFF for product-specific data.

Figure 1-2 shows the Boot Flow process where the flash usage is put into perspective, assuming a valid image is already present in flash.

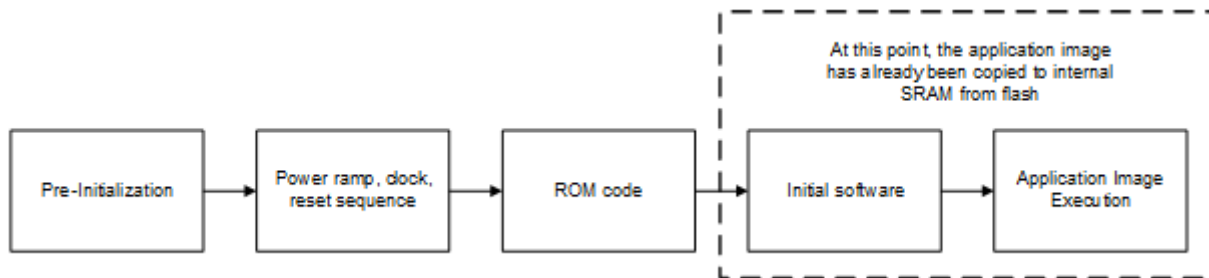


Figure 1-2. General Boot Flow

ADVANCE INFORMATION

2 Acronyms Used in This Document

SBL	Secondary Boot loader
MCU	Microcontroller Unit
OSPI	Octal Serial Peripheral Interface
QSPI	Quad Serial Peripheral Interface
ROM	Read-only memory
SoC	System on a Chip
SDK	Software Development Package
UART	Universal Asynchronous Receiver-Transmitter
RWW	Read While Write

3 ROM Boot Requirements

As [Figure 1-2](#) shows, the boot flow process is a sequence adopted by AM261x that starts upon power-on. ROM code on the R5F is set to work in a certain way which is described in the Initialization chapter of the device-specific Technical Reference Manual. The ROM code expects specific instructions from the flash and expects specific timing and framing configurations for establishing communication. Multiple boot modes are supported in the AM261x device, and ROM code expects the following support:

- Flash device operating with 1.8V and 3.3V are supported.
- In OSPI boot mode, the flash must support Octal Output Fast Read (opcode 0x8B) and the 1S-1S-8S transfer protocol.
- In QSPI boot mode, the flash must support Quad Output Fast Read (opcode 0x6B) and the 1S-1S-4S transfer protocol.
- Flash device must allow 8 *dummy* clock cycles for setting up the initial address during the previously-mentioned read operations.
- Flash device must boot in 1S mode by default.
- Flash must support 3-byte (24-bit) addressing mode by default.
- Flash memory size 4MB is recommended as a minimum.

All of this information is available in the data sheet of the flash device being evaluated. A flash device must support all of the points mentioned above to meet AM261x compatibility requirements.

4 Application Requirements

Application-specific requirements tend to be more lenient than the ROM code execution requirements as improper configuration and lack of support do not result in system boot failure. The following requirements must be met for general flash applications:

- Flash device must operating with either 1.8V or 3.3V vicinity
- If the flash memory is larger than 16MB (128Mb), then a flash device package with support for a RESET signal is required to prevent a device warm reset from affecting ROM code execution.
 - For lower memory density flash devices that support a RESET signal, the recommended practice is connect the RESET signal.

Note

Even though there is not a hard limit imposed on the flash memory that can be used, AM261x only supports up to 4-byte addressing communication mode. As a result, any address requiring over 32 bits to reach is virtually inaccessible.

5 Additional Usage Factors

Consider the following items when deciding on what flash part to use for the application:

- What is the flash required for? Some applications require more flash storage than others depending on whether or not the memory is used for booting or storage.
- Is the entirety of the memory be used? A smaller and lower-cost flash device can be used if a large storage space is not needed.
- Is the application heavily flash dependent? Typically, 8MB to 16MB is enough for an application, but this varies depending on how heavily external storage is being used.
- Does the flash part support a RESET signal? If at any point of the application 4-byte addressing mode must be used, then a RESET signal is required to prevent booting problems upon reset.
- Flash device with RWW support must be used if this function is intended to be used during application

6 Flash Support in MCU PLUS SDK

The MCU PLUS SDK comes with default flash software support for specific flash memories in the library. If the evaluated flash meets requirements but does not have compatible software drivers in the SDK, then please follow instructions on how to add support for the flash memory: [Adding Support For a Custom Flash Device](#).

7 Boot Compatible Flash Devices

The following list shows devices that meet the requirements for correct operation with the AM261x Sitara MCU as per the information contained in the device-specific data sheets. Use this list for reference only:

- IS25WX Series
 - Manufacturer: Integrated Silicon Solution, Inc.
- MX25UW Series
 - Manufacturer: Macronix
- GD25LX Series
 - Manufacturer: GigaDevice

8 Tested Flash Devices

The following is a short list of devices that have been verified to work with AM261x.

- GD25LX256EBARY
- IS25WX064-JHLE
- MX25UW6445GXDQ00

Note

For information on physical connections between SoC and external flash, see the *OSPI Environment* section in the AM261x Technical Reference Manual.

9 Related Documentation From Texas Instruments

AM261x Documentation

- [AM261x Data sheet](#)
- [AM261x Errata](#)
- [AM261x Technical Reference Manual](#)
- [AM261x Register Addendum](#)
- [AM261x Flash Selection Guide](#)
- Submit Request for [AM261x HSM Addendum](#) here.

AM261x Evaluation Modules

- [AM261x LaunchPad \(LP-AM261\)](#)

10 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
November 2024	*	Initial Release

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