SecSi Sector
Customer Lock Status Check
Application Note

July 2003

The following document refers to Spansion memory products that are now offered by both Advanced Micro Devices and Fujitsu. Although the document is marked with the name of the company that originally developed the specification, these products will be offered to customers of both AMD and Fujitsu.

Continuity of Specifications

There is no change to this document as a result of offering the device as a Spansion product. Any changes that have been made are the result of normal documentation improvements and are noted in the document revision summary, where supported. Future routine revisions will occur when appropriate, and changes will be noted in a revision summary.

Continuity of Ordering Part Numbers

AMD and Fujitsu continue to support existing part numbers beginning with "Am" and "MBM". To order these products, please use only the Ordering Part Numbers listed in this document.

For More Information

Please contact your local AMD or Fujitsu sales office for additional information about Spansion memory solutions.

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Secured Silicon (SecSi) Sector Customer Lock Status Check

Application Note

This application note assumes that users are famliar with Flash Technology and HW/SW System Design, including but not restricted to memory architecture, autoselect mode definitions, and software command sequences.

Introduction

AMD offers Flash devices that come with the SecSi Sector either factory locked through the Express Flash™ Service, or customer lockable. When the SecSi Sector is not locked at the AMD factory, DQ7 of the Autoselect Byte 3 at address 03h will be permanently set to a '0'. For customer locking of the SecSi Sector, the user has to determine if the SecSi Sector area has been locked or an error has occurred during the locking process. This document will provide a procedure for the user to check the locking status of the SecSi Sector area when the SecSi Sector is not factory locked.

Memory Architecture

The SecSi Sector area is a separate memory area from the main memory area. The SecSi Sector is commonly referred to as a one time programmable (OTP) memory area. The main memory area may be programmed and erased up to 1 million times, while the SecSi Sector area can be programmed multiple times before the SecSi Sector is locked. If the SecSi Sector is 256 bytes, then a "1" can be programmed to a "0" and cannot be erased back to a "1" before locking. If the SecSi Sector is 64 kbytes, all program and erase operations are allowed before locking. The SecSi Sector is enabled through initiation of the "SecSi Sector Entry" command. The SecSi Sector can be disabled through the "SecSi Sector Exit" or "Reset" command. Illustrated in Figure 1 is the standard AMD memory architecture.

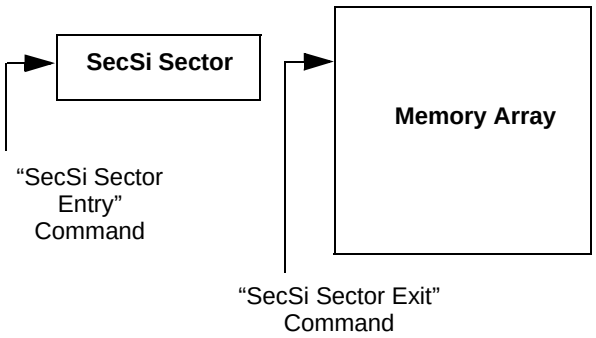

Figure 1. Standard AMD Memory Architecture

When reading from the main memory array, the address of the sector is required to read out data stored in that particular sector. To program a sector within the main memory array, a 4-cycle programming sequence is needed. Reading and programming of the SecSi Sector requires the "SecSi Sector Entry" command to be issued before any read or programming operations are to occur. After reading or programming of the SecSi Sector is completed, the "SecSi Sector Exit" or "Reset" command has to be issued to revert the pointer back to the main memory array.

Valid Implementation of the SecSi Sector Customer Lock

Since there are no status bits allocated for SecSi Sector Customer Lock Status Check, the following procedure has to be followed to correctly lock the SecSi Sector area.

The complete software command procedure must be used to program and verify the SecSi Sector Customer Lock Status. This example is shown in Figure 2, Program and Verify section. High voltage in Figure 2 is not needed. If the user only wishes to check the SecSi Sector Customer Lock Status, two steps allocated only

for locking of the SecSi Sector MUST be skipped. This example is shown in Figure 2, Verify Only section.

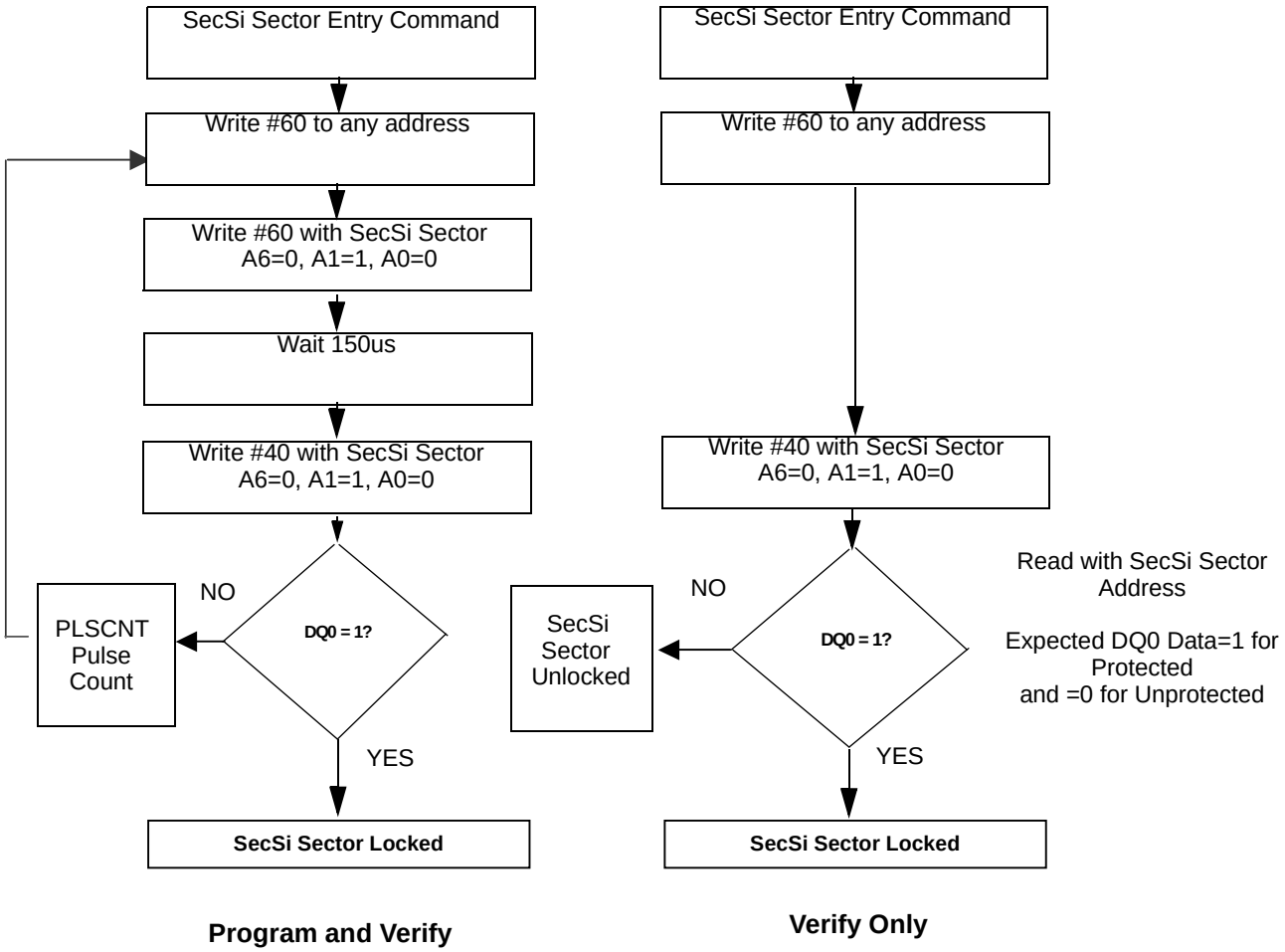

Figure 2. Program and Verify Algorithm

The software algorithms illustrated in Figure 2 are very similar to the “In-System Sector Protection Algorithm” figures listed in AMD Flash memory datasheets. After verifying that the SecSi Sector has been properly locked, either a “SecSi Sector Exit” or “Reset” command may be issued to allow access to the main memory array.

Invalid Implementation of the SecSi Sector Customer Lock

Many customers may think that using the Autoselect Byte 2, the “Sector Protection Verification” bit DQ0, after entering the SecSi Sector area may read out the Sector Customer Lock Status Bit. This is an incorrect assumption. Flow and architectural diagrams illustrating the invalid implementation of the SecSi Sector Customer Lock Status Check are Figures 3 and 4.

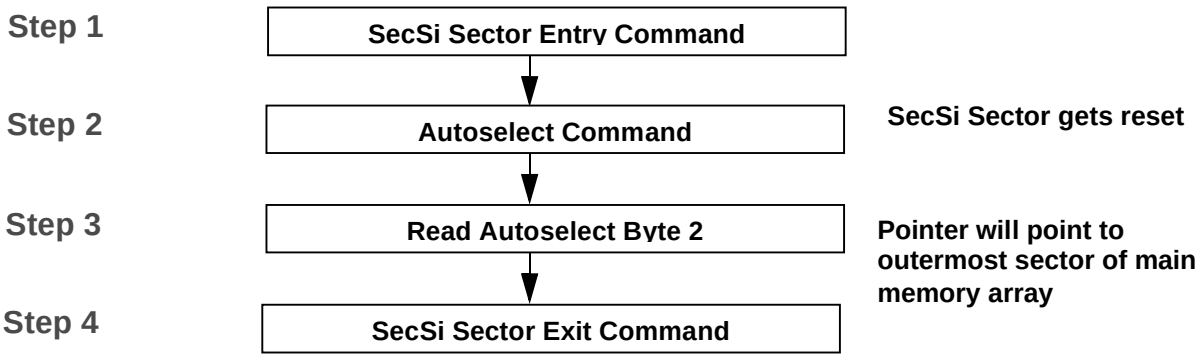

Figure 3. Invalid Command Implementation

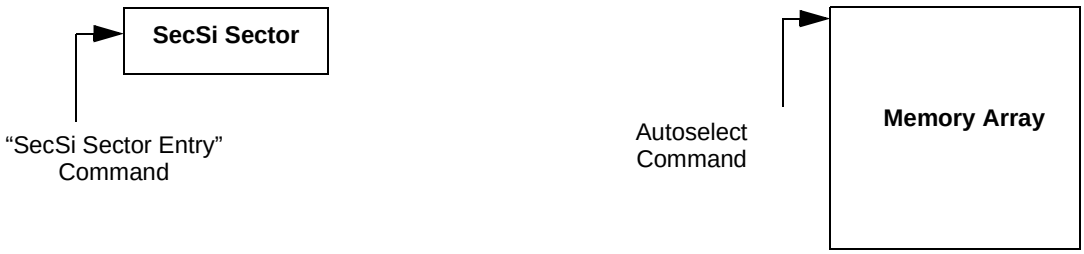

Figure 4. Resulting Memory Pointer Location

When issuing the Autoselect command after entering the SecSi Sector, the pointer will reset itself to point to the main memory array. Therefore reading Autoselect Byte 2 will indicate the locking status of boot sector in the picture above, not the SecSi Sector Customer Lock Status.

Conclusion

Implementing the SecSi Sector Customer Lock Status Algorithm will help the user to check the locking status of the SecSi Sector through software command sequences with ease. High voltage power supply is not required to implement the Customer Lock Status Algorithm.