SST28SF040–Compatibility Considerations Between 4 Megabit Flash Products

Application Note
Revised March 1999

INTRODUCTION

The SST28SF040, Atmel 29C040 and AMD 29F040 **are not** 100% Program and Erase compatible for several reasons.

1. SST and AMD devices require a separate Erase command, whereas the Atmel device automatically erases prior to programming.
2. SST and AMD devices program in the Byte-Mode whereas the Atmel device programs in the Page-Mode.
3. SST's 28SF040 has the smallest erase block (256 Byte page), followed by Atmel's 29C040 (512 Byte page.) AMD's 29F040 has the largest block by far (64 KByte sector.)

As you can see, none of the 5 volt 4Mbit devices can be a direct second source/replacement for one another. The one recommendation to a customer looking for a second source is to read the device ID code and have an intelligent programming routine that would use the appropriate programming algorithm for each manufacturer. The drawbacks to this are (1) the hardware Read-ID requires 12 volts on A9 and (2) the software Read-ID are not standardized between manufacturers.

SST's Software ID access requires one byte command sequence whereas Atmel and AMD require three bytes command sequence. The SST device can be interrogated using AMD's/Atmel's ID procedure without any ill effects, if Software Data Protect is enabled (the SST28SF040 is powered up in the Protected state). With the SST28SF040 in the Protected state, the device will issue an internal Reset. Due to the Reset, the I/O's will be in a high impedance state for 4 µs (T_{RST}), afterwards it will be in the read state. If the SST28SF040 is in the Unprotected state then the device will write the command codes as data.

CONVERSION FROM AMD 29F040 TO SST 28SF040

To convert from AMD 29F040 to SST28SF040 will require some software modifications. The purpose of this paper is to outline the changes needed.

Software Data Protection

The AMD 29F040 uses three and six Byte-Write sequences to access the device for programming and erasing. The SST28SF040 uses a seven byte read sequence for disabling Software Data Protect and then a two step sequence for Erase (Chip- or Sector-) and Byte-Program, involving specific Command Codes for each function. The Software Data Protect Disable will disable the SST28SF040 until the device is either powered down or the Software Data Protect Enable sequence is used. The Command Code is a single Byte-Write of hex data (unique data for each function) prior to each function. Please refer to the SST28SF040 for Command Code details.

This Software Data Protect Entry difference is assumed in the following discussions of device functions.

Sector-Erase

The AMD 29F040 sector is 64 KBytes with 8 total sectors in the device. The SST28SF040 sector is 256 Bytes with 2048 total sectors. The AMD sector address is controlled by A16 - A18. The SST sector address is controlled by A8 - A18. The AMD Sector-Erase time is 1.5 seconds (minimum) and SST Sector-Erase time is 4 ms (maximum). The SST28SF040 does not have a Sector-Erase Suspend feature. However this feature is not needed with the SST's smaller sector size and short erase time.

Chip-Erase

The AMD Sector-Erase time is 1.5 seconds (minimum) and SST Chip-Erase time is 20 ms (maximum).

Byte-Program

The AMD Byte-Program time is 16 µs (minimum) and SST Byte-Program time is 40 µs (maximum).

Software ID

The SST device can be interrogated using AMD's ID procedure without any ill effects if Software Data Protect is enabled (the SST28SF040 is powered up in the Protected state). The SST28SF040 will not recognize the commands and may write data depending upon the state of the Software Data Protect. With the SST28SF040 in the Protected state, the device will issue an internal Reset and the SST28SF040 will not write data. Due to the Reset, the I/O's will be in a high impedance state up to 4 µs (T_{RST}), afterwards it will be in the read state. If the SST28SF040 is in the Unprotected state then the device could write the command codes as data.

Software Drivers
SST provides a software driver (in text format) for both C and X86 assembler languages, available in a 3.5 diskette (along with software drivers for all of the SST devices). The driver is also available on SST's Internet web site (http://www.ssti.com). The driver functions as both a starting block for new software or as a reference to existing software.

CONVERSION FROM ATMEL 29C040 TO SST28SF040

To convert from Atmel 29C040 to SST28SF040 will require some software modifications. The purpose of this paper is to outline the changes needed.

Software Data Protection
The Atmel 29C040 uses three and six Byte-Write sequences to access the device for programming and erasing. The SST28SF040 uses a seven byte read sequence for disabling Software Data Protect then a two step sequence for Erase (Chip- or Sector-) and Byte-Program, involving specific Command Codes for each function. The Software Data Protect Disable will disable the SST28SF040 until the device is either powered down or the Software Data Protect Enable sequence is used. The Command Code is a single Byte-Write of hex data (unique data for each function) prior to each function. Please refer to the SST28SF040 for Command Code details.

This Software Data Protect Entry difference is assumed in the following discussions of device functions.

Sector-Erase
The SST28SF040 sector is 256 Bytes with 2048 total sectors. The Atmel 29C040 is a Page-Write device and does not have a separate erase function. The SST sector address is controlled by A8 - A18. SST Sector-Erase time is 4 ms (maximum).

Byte-Program
SST Byte-Program time is 40 µs (maximum). Atmel uses a Page-Write of 512 Bytes with a write time of 10 ms (maximum). There are 1024 pages in the Atmel 29C040 and the page is controlled by A9 - A18.

Software ID
The SST device can be interrogated using Atmel's ID procedure without any ill effects if Software Data Protect is enabled (the SST28SF040 is powered up in the Protected state). The SST28SF040 will not recognize the commands and may write data depending upon the state of the Software Data Protect. With the SST28SF040 in the Protected state, the device will issue an internal Reset and the SST28SF040 will not write data. Due to the Reset, the I/O's will be in a high impedance state up to 4 µs (T_{RST}), afterwards it will be in the read state. If the SST28SF040 is in the Unprotected state then the device could write the command codes as data.

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