

# Designing In SST's 28SF040 4 Megabit SuperFlash EEPROM



*Application Note*  
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## 1.0 INTRODUCTION

This design note describes the key benefits of SST's 28SF040 SuperFlash memory and how it can be used in existing AMD Am29F040 and Atmel AT29C040 designs.

## 2.0 Benefits of SST's 28SF040

### 2.1 Single power supply for read and write

The SST28SF040 device uses a single power supply for both read and write. It is available in 5.0 Volt-only, 3.0 Volt-only and 2.7 Volt-only versions. This eliminates the need for a D.C. to D.C. converter or a switch to translate the system voltage level from 5.0 V (or 3.0 V) to 12.0 V for program and erase operations. This simplifies the hardware design and results in lower system cost and reduced board space.

### 2.2 Smaller sector architecture

The SST28SF040 device is based on a smaller sector architecture and the sector size is only 256 Bytes as opposed to 64 KByte sector size supported by other 4 Mbit flash products available. It simplifies the design and debugging process by allowing a system designer to reprogram a smaller portion of the memory array during code updates. This results in faster design and debugging process and hence improved time to market. This feature also makes the SST28SF040 device highly suitable for both code as well as any configuration or data storage application.

### 2.3 Faster Write operation

The SST28SF40 device takes only 2 ms to erase the entire sector (256 Bytes) and then reprogram in less than 40 ms per byte. Other flash devices based on traditional sector architecture takes several seconds to rewrite (erase and reprogram the sector) the code even though it were only few bytes. The faster erase and reprogram operation reduces the test and manufacturing time which results in lower manufacturing cost.

### 2.4 JEDEC standard package/pinout

The SST28SF040 device is offered in 32 pin PDIP, PLCC and TSOP packages. These packages are pin compatible with industry standard 1-4 Mbit EPROM and flash footprints. This will enable nonvolatile system designers to migrate from 1 or 2 Mbit to 4 Mbit design without any change in board layout.

## 3.0 Design Considerations

### 3.1 SST28SF040 and AMD Am29F040 Pin Out Comparison

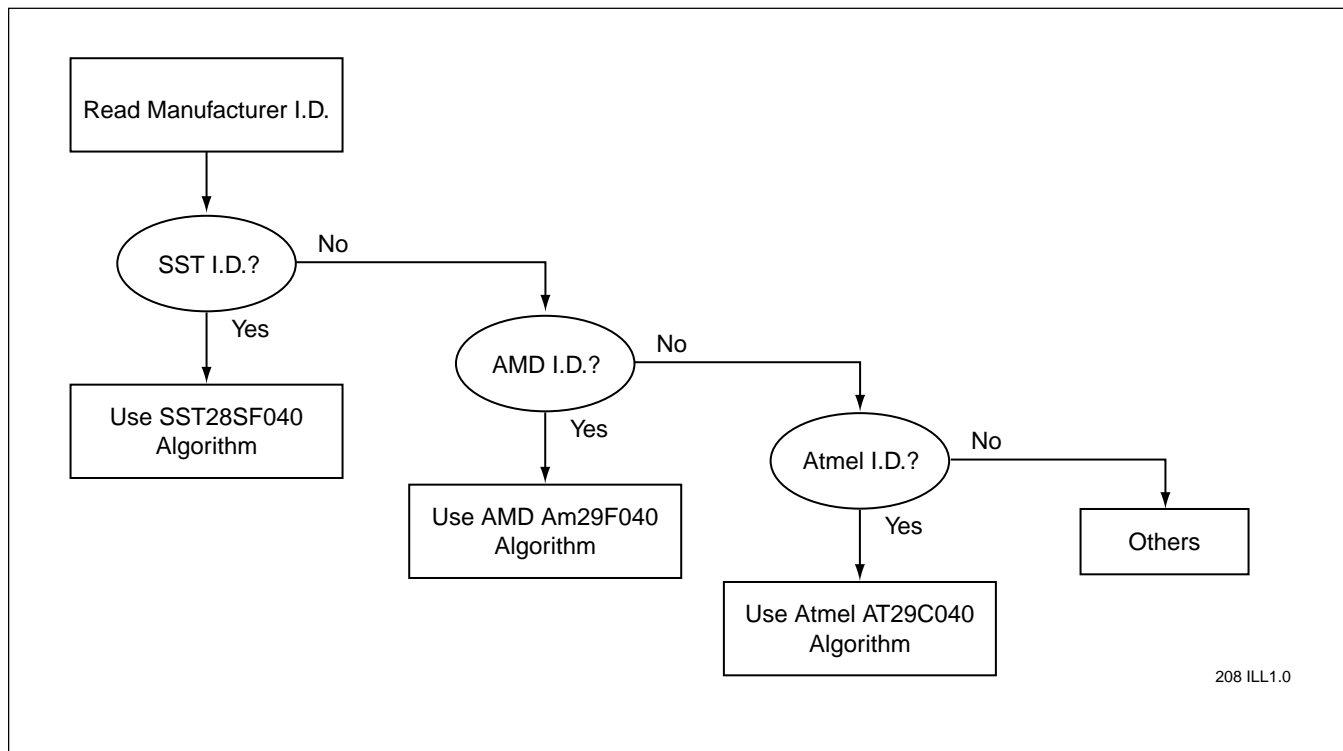
Both SST28SF040 and Am29F040 devices are offered in 32-pin PDIP, PLCC, and TSOP packages. The SST28SF040 device is also pin to pin compatible to Am29F040 device in all packages. Therefore, the SST28SF040 may be used in a Am29F040 based design without any modification in board layout.

### 3.2 SST28SF040 and Atmel AT29C040 Pin Out Comparisons

The Atmel AT29C040 is offered in 32 pin PDIP and 40-pin TSOP packages. The AT29C040 is not offered in 32-pin PLCC package. Both SST28SF040 and AT29C040 are pin to pin compatible in 32-pin PDIP package and hence they can be used as socket replacement for each other. In terms of TSOP package, the SST28SF040 is offered in both 32-pin and 40-pin package. The AT29C040 is offered in 40-pin TSOP package only with same pinout as the SST28SF040 40-pin TSOP device. In addition, the SST28SF040's 32-pin TSOP device will also fit into the AT29C040 40-pin TSOP footprint as eight corner pins are NC pins. This enables the system designers to replace the AT29C040 40-pin TSOP with the SST28SF040 32-pin TSOP device without any change in board layout.

### 3.3 Software Design Considerations

Although the specific commands used to implement the program and erase algorithms are different between the SST28SF040, Am29F040 and AT29C040, one command sequence may be used to determine whether the SST, AMD or Atmel device is in the system. The flow-chart below shows how to determine the manufacturing I.D. and then jump to the appropriate



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FIGURE 1: MANUFACTURER ID DETERMINATION FLOW CHART

The manufacturing ID check routine written for Am29F040 or AT29C040 will also work for SST28SF040. Please refer to the manufacturing ID command sequence table for Am29F040 and SST28SF040 devices. Please note that the first two byte sequences are invalid commands for the SST28SF040 device and hence ignored. The third byte sequence writes product ID command (90H) at address 5555H for the Am29F040 and AT29C040 devices. Since, the address is “don’t care” for the SST28SF040 during the third byte sequence, the device recognizes the product ID command (5555H/90H) and a manufacturing ID is given

during the fourth byte sequence. The fourth byte sequence provides the manufacturing ID when read at address 00h. If the manufacturing ID is found to be BFh, the SST software driver is used, otherwise the other appropriate software driver (AMD or Atmel) is used.

#### 4.0 Software Driver

SST provides a SST28SF040 software driver for SST28SF040 device both in ‘C’ and 8086 assembly languages, available in a 3.5” diskette. The driver is also available on SST’s Internet web site (<http://www.ssti.com>). Please call SST for diskette version of software driver.

TABLE 1: MANUFACTURING ID COMMAND SEQUENCE

Device	1st Byte Seq.		2nd Byte Seq.		3rd Byte Seq.		4th Byte Seq.	
	Addr	Data	Addr	Data	Addr	Data	Addr	Data
Am29F040	5555 H	AA H	2AAA H	55 H	5555 H	90 H	0000 H	01 H
AT29C040	5555 H	AA H	2AAA H	55 H	5555 H	90 H	0000 H	1F H
SST28SF040	Ignored	Ignored	Ignored	Ignored	XXXX H	90 H	0000 H	BF H

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