

16 Mbit SPI Serial Flash EOL Supplemental Information

1.0 PRODUCT DESCRIPTION

The 25 series Serial Flash family features a four-wire, SPI-compatible interface that allows for a low pin-count package which occupies less board space and ultimately lowers total system costs. The SST25VF016B devices are enhanced with improved operating frequency and even lower power consumption than the original SST25VFxxxA devices. SST25VF016B SPI serial flash memories are manufactured with proprietary, high-performance CMOS SuperFlash technology. The split-gate cell design and thick-oxide tunneling injector attain better reliability and manufacturability compared with alternate approaches.

This document provides supplemental information about the 75/80 MHz parts which are End-of-Life (EOL). Except for the information provided herein, the EOL parts behave as described in the SST25VF016B data sheet DS-20005044. See [page 6](#) for specific part numbers.

2.0 DEVICE OPERATION

2.1 Instructions

Instructions are used to read, write (Erase and Program), and configure the SST25VF016B. The instruction bus cycles are 8 bits each for commands (Op Code), data, and addresses. Prior to executing any Byte-Program, Auto Address Increment (AAI) programming, Sector-Erase, Block-Erase, Write-Status-Register, or Chip-Erase instructions, the Write-Enable (WREN) instruction must be executed first. The complete list of instructions is provided in [Table 2-1](#). All instructions are synchronized off a high to low transition of CE#. Inputs will be accepted on the rising edge of SCK starting with the most significant bit. CE# must be driven low before an instruction is entered and must be driven high after the last bit of the instruction has been shifted in (except for Read, Read-ID, and Read-Status-Register instructions). Any low to high transition on CE#, before receiving the last bit of an instruction bus cycle, will terminate the instruction in progress and return the device to standby mode. Instruction commands (Op Code), addresses, and data are all input from the most significant bit (MSB) first.

TABLE 2-1: DEVICE OPERATION INSTRUCTIONS

Instruction	Description	Op Code Cycle ¹	Address Cycle(s) ²	Dummy Cycle(s)	Data Cycle(s)	Maximum Frequency
Read	Read Memory at 25 MHz	0000 0011b (03H)	3	0	1 to ∞	25 MHz
High-Speed Read	Read Memory at 80 MHz	0000 1011b (0BH)	3	1	1 to ∞	80 MHz
4 KByte Sector-Erase ³	Erase 4 KByte of memory array	0010 0000b (20H)	3	0	0	80 MHz
32 KByte Block-Erase ⁴	Erase 32 KByte block of memory array	0101 0010b (52H)	3	0	0	80 MHz
64 KByte Block-Erase ⁵	Erase 64 KByte block of memory array	1101 1000b (D8H)	3	0	0	80 MHz
Chip-Erase	Erase Full Memory Array	0110 0000b (60H) or 1100 0111b (C7H)	0	0	0	80 MHz
Byte-Program	To Program One Data Byte	0000 0010b (02H)	3	0	1	80 MHz
AAI-Word-Program ⁶	Auto Address Increment Programming	1010 1101b (ADH)	3	0	2 to ∞	80 MHz
RDSR ⁷	Read-Status-Register	0000 0101b (05H)	0	0	1 to ∞	80 MHz
EWSR	Enable-Write-Status-Register	0101b 0000b (50H)	0	0	0	80 MHz
WRSR	Write-Status-Register	0000 0001b (01H)	0	0	1	80 MHz

TABLE 2-1: DEVICE OPERATION INSTRUCTIONS

Instruction	Description	Op Code Cycle ¹	Address Cycle(s) ²	Dummy Cycle(s)	Data Cycle(s)	Maximum Frequency
WREN	Write-Enable	0000 0110b (06H)	0	0	0	80 MHz
WRDI	Write-Disable	0000 0100b (04H)	0	0	0	80 MHz
RDID ⁸	Read-ID	1001 0000b (90H) or 1010 1011b (ABH)	3	0	1 to ∞	80 MHz
JEDEC-ID	JEDEC ID read	1001 1111b (9FH)	0	0	3 to ∞	80 MHz
EBSY	Enable SO to output RY/BY# status during AAI programming	0111 0000b (70H)	0	0	0	80 MHz
DBSY	Disable SO as RY/BY# status during AAI programming	1000 0000b (80H)	0	0	0	80 MHz

0 25044

1. One bus cycle is eight clock periods.
2. Address bits above the most significant bit of each density can be V_{IL} or V_{IH}.
3. 4KByte Sector Erase addresses: use A_{MS}-A₁₂, remaining addresses are don't care but must be set either at V_{IL} or V_{IH}.
4. 32KByte Block Erase addresses: use A_{MS}-A₁₅, remaining addresses are don't care but must be set either at V_{IL} or V_{IH}.
5. 64KByte Block Erase addresses: use A_{MS}-A₁₆, remaining addresses are don't care but must be set either at V_{IL} or V_{IH}.
6. To continue programming to the next sequential address location, enter the 8-bit command, ADH, followed by 2 bytes of data to be programmed. Data Byte 0 will be programmed into the initial address [A₂₃-A₁] with A₀=0, Data Byte 1 will be programmed into the initial address [A₂₃-A₁] with A₀=1.
7. The Read-Status-Register is continuous with ongoing clock cycles until terminated by a low to high transition on CE#.
8. Manufacturer's ID is read with A₀=0, and Device ID is read with A₀=1. All other address bits are 00H. The Manufacturer's ID and device ID output stream is continuous until terminated by a low-to-high transition on CE#.

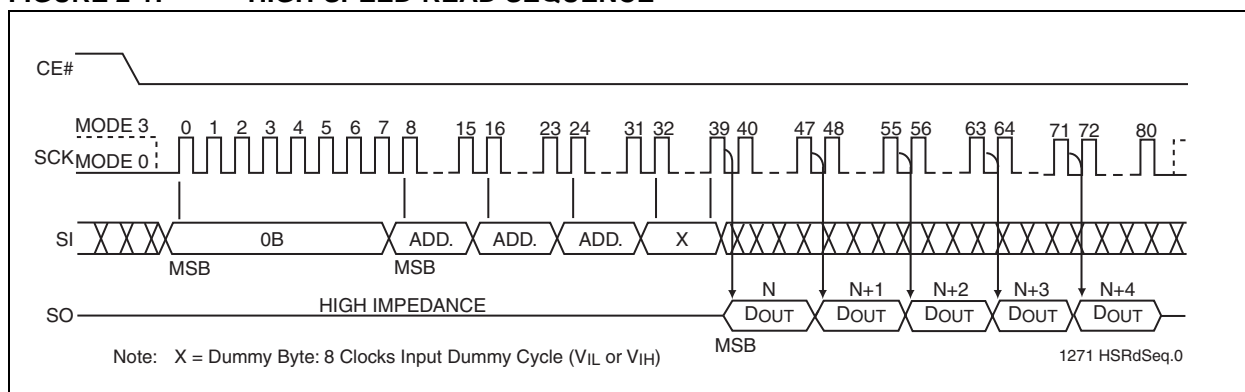
2.1.1 HIGH-SPEED-READ (80 MHZ)

The High-Speed-Read instruction supporting up to 80 MHz Read is initiated by executing an 8-bit command, 0BH, followed by address bits [A₂₃-A₀] and a dummy byte. CE# must remain active low for the duration of the High-Speed-Read cycle. See Figure 2-1 for the High-Speed-Read sequence.

Following a dummy cycle, the High-Speed-Read instruction outputs the data starting from the specified address location. The data output stream is continuous

through all addresses until terminated by a low to high transition on CE#. The internal address pointer will automatically increment until the highest memory address is reached. Once the highest memory address is reached, the address pointer will automatically increment to the beginning (wrap-around) of the address space. Once the data from address location 1FFFFFH has been read, the next output will be from address location 000000H.

FIGURE 2-1: HIGH-SPEED-READ SEQUENCE



3.0 ELECTRICAL SPECIFICATIONS

TABLE 3-1: DC OPERATING CHARACTERISTICS

Symbol	Parameter	Limits			Test Conditions
		Min	Max	Units	
I _{DDR}	Read Current		10	mA	CE#=0.1 V _{DD} /0.9 V _{DD} @25 MHz, SO=open
I _{DDR2}	Read Current		15	mA	CE#=0.1 V _{DD} /0.9 V _{DD} @50 MHz, SO=open
I _{DDR3}	Read Current		20	mA	CE#=0.1 V _{DD} /0.9 V _{DD} @80 MHz, SO=open
I _{DDW}	Program and Erase Current		30	mA	CE#=V _{DD}
I _{SB}	Standby Current		20	μA	CE#=V _{DD} , V _{IN} =V _{DD} or V _{SS}
I _{LI}	Input Leakage Current		1	μA	V _{IN} =GND to V _{DD} , V _{DD} =V _{DD} Max
I _{LO}	Output Leakage Current		1	μA	V _{OUT} =GND to V _{DD} , V _{DD} =V _{DD} Max
V _{IL}	Input Low Voltage		0.8	V	V _{DD} =V _{DD} Min
V _{IH}	Input High Voltage	0.7 V _{DD}		V	V _{DD} =V _{DD} Max
V _{OL}	Output Low Voltage		0.2	V	I _{OL} =100 μA, V _{DD} =V _{DD} Min
V _{OL2}	Output Low Voltage		0.4	V	I _{OL} =1.6 mA, V _{DD} =V _{DD} Min
V _{OH}	Output High Voltage	V _{DD} -0.2		V	I _{OH} =-100 μA, V _{DD} =V _{DD} Min

TABLE 3-2: AC OPERATING CHARACTERISTICS

Symbol	Parameter	80 MHz		Units
		Min	Max	
F _{CLK} ¹	Serial Clock Frequency		80	MHz
T _{SCKH}	Serial Clock High Time	6		ns
T _{SCKL}	Serial Clock Low Time	6		ns
T _{SCKR} ²	Serial Clock Rise Time (Slew Rate)	0.1		V/ns
T _{SCKF}	Serial Clock Fall Time (Slew Rate)	0.1		V/ns
T _{CES} ³	CE# Active Setup Time	5		ns
T _{CEH} ³	CE# Active Hold Time	5		ns
T _{CHS} ³	CE# Not Active Setup Time	5		ns
T _{CHH} ³	CE# Not Active Hold Time	5		ns
T _{CPH}	CE# High Time	50		ns
T _{CHZ}	CE# High to High-Z Output		7	ns
T _{CLZ}	SCK Low to Low-Z Output	0		ns
T _{DS}	Data In Setup Time	2		ns
T _{DH}	Data In Hold Time	4		ns
T _{HLS}	HOLD# Low Setup Time	5		ns
T _{HHS}	HOLD# High Setup Time	5		ns
T _{HLH}	HOLD# Low Hold Time	5		ns
T _{HHH}	HOLD# High Hold Time	5		ns
T _{HZ}	HOLD# Low to High-Z Output		7	ns
T _{LZ}	HOLD# High to Low-Z Output		7	ns
T _{OH}	Output Hold from SCK Change	0		ns
T _V	Output Valid from SCK		6	ns
T _{SE}	Sector-Erase		25	ms
T _{BE}	Block-Erase		25	ms
T _{SCE}	Chip-Erase		50	ms
T _{BP}	Byte-Program		10	μs

1. Maximum clock frequency for Read Instruction, 03H, is 25 MHz

2. Maximum Rise and Fall time may be limited by T_{SCKH} and T_{SCKL} requirements

3. Relative to SCK.

TABLE 3-3: REVISION HISTORY

Revision	Description	Date
A	• Initial release of EOL data sheet	Apr 2015

THE MICROCHIP WEB SITE

Microchip provides online support via our WWW site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or Field Application Engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: <http://microchip.com/support>

4.0 PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.		-	XX	-	XX	-	XX	-	X
Device	Operating Frequency		Minimum Endurance	Temp Range	Package		Tape/Reel Indicator		
Device:	SST25VF016B	=	16 Mbit, 2.7-3.6V, SPI Flash Memory						
Operating Frequency:	75	=	75 MHz (80 MHz)						
Minimum Endurance	4	=	10,000 cycles						
Temperature:	I	=	-40°C to +85°C						
	C	=	0°C to +70°C						
Package:	QAE	=	WSON (6mm x 5mm Body), 8-lead						
	S2AE	=	SOIC (200 mil Body), 8-lead						
Tape and Reel Flag:	T	=	Tape and Reel						

Valid Combinations:

- SST25VF016B-75-4I-S2AE
- SST25VF016B-75-4I-S2AE-T
- SST25VF016B-75-4I-QAE
- SST25VF016B-75-4I-QAE-T

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, flexPWR, JukeBlox, KEELOQ, KEELOQ logo, Kleer, LANCheck, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC³² logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

The Embedded Control Solutions Company and mTouch are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, ECAN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, KleerNet, KleerNet logo, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, RightTouch logo, REAL ICE, SQI, Serial Quad I/O, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2015, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN:978-1-63277-221-3

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

**QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
= ISO/TS 16949 =**



Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983
Indianapolis

Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon

Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Dongguan
Tel: 86-769-8702-9880

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Druenen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

01/27/15