MX25V8035F

2.3V-3.6V, 8M-BIT [x 1/x 2/x 4]
CMOS MXSMIO® (SERIAL MULTI I/O)
FLASH MEMORY

Key Features

- 2.3V-3.6V *for Read, Erase and Program Operations*
- *Unique ID and Secure OTP Support*
- *Multi I/O Support - Single I/O, Dual I/O and Quad I/O*
- *Program Suspend/Resume & Erase Suspend/Resume*

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2.3V-3.6V 8M-BIT [x 1/x 2/x 4] CMOS MXSMIO® (SERIAL MULTI I/O) FLASH MEMORY

1. FEATURES

GENERAL

- Supports Serial Peripheral Interface -- Mode 0 and Mode 3
- 8,388,608 x 1 bit structure
  or 4,194,304 x 2 bits (two I/O mode) structure
  or 2,097,152 x 4 bits (four I/O mode) structure
- Equal Sectors with 4K byte each, or Equal Blocks with 32K/64K byte each
  - Any Block can be erased individually
- Single Power Supply Operation
  - Operation Voltage: 2.3V-3.6V for Read, Erase and Program Operations
- Latch-up protected to 100mA from -1V to Vcc +1V

PERFORMANCE

- High Performance
  - Fast read
    - 1 I/O: 108MHz with 8 dummy cycles
    - 2 I/O: 104MHz with 4 dummy cycles, equivalent to 208MHz
    - 4 I/O: 104MHz with 2+4 dummy cycles, equivalent to 416MHz
  - Fast program and erase time
  - 8/16/32/64 byte Wrap-Around Burst Read Mode
- Low Power Consumption
- Minimum 100,000 erase/program cycles
- 20 years data retention

SOFTWARE FEATURES

- Input Data Format
  - 1-byte Command code
- Advanced Security Features
  - Block lock protection
  The BP0-BP3 status bit defines the size of the area to be software protection against program and erase instructions
- Additional 8K bits secured OTP
  - Features unique identifier.
  - Factory locked identifiable and customer lockable
- Auto Erase and Auto Program Algorithm
  - Automatically erases and verifies data at selected sector or block
  - Automatically programs and verifies data at selected page by an internal algorithm that automatically times the program pulse widths (Any page to be programed should have page in the erased state first)
- Status Register Feature
- Command Reset
- Program/Erase Suspend and Program/Erase Resume
- Electronic Identification
  - JEDEC 1-byte manufacturer ID and 2-byte device ID
  - RES command for 1-byte Device ID
  - REMS command for 1-byte manufacturer ID and 1-byte device ID
- Support Serial Flash Discoverable Parameters (SFDP) mode
- Support Unique ID (Please contact local Macronix sales for detail information)

HARDWARE FEATURES

- SCLK Input
  - Serial clock input
- SI/SIO0
  - Serial Data Input or Serial Data Input/Output for 2 x I/O read mode and 4 x I/O read mode
- SO/SIO1
  - Serial Data Output or Serial Data Input/Output for 2 x I/O read mode and 4 x I/O read mode
- WP#/SIO2
  - Hardware write protection or Serial Data Input/Output for 4 x I/O read mode
- HOLD#/SIO3
  - HOLD feature, to pause the device without deselecting the device or Serial input & Output for 4 x I/O read mode
- PACKAGE
  - 8-pin SOP (150mil/200mil)
  - 8-land USON (2x3mm)
  - 8-land WSON (6x5mm)
  - **All devices are RoHS Compliant and Halogen-free**

2. GENERAL DESCRIPTION

MX25V8035F is 8Mb bits Serial NOR Flash memory, which is configured as 1,048,576 x 8 internally. When it is in four I/O mode, the structure becomes 2,097,152 bits x 4 or 4,194,304 bits x 2.

MX25V8035F features a serial peripheral interface and software protocol allowing operation on a simple 3-wire bus while it is in single I/O mode. The three bus signals are a clock input (SCLK), a serial data input (SI), and a serial data output (SO). Serial access to the device is enabled by CS# input.

When it is in two I/O read mode, the SI pin and SO pin become SIO0 pin and SIO1 pin for address/dummy bits input and data output. When it is in four I/O read mode, the SI pin, SO pin, WP# pin and HOLD# pin become SIO0 pin, SIO1 pin, SIO2 pin and SIO3 pin for address/dummy bits input and data output.

The MX25V8035F MXSMIO® (Serial Multi I/O) provides sequential read operation on the whole chip.

After program/erase command is issued, auto program/erase algorithms which program/erase and verify the specified page or sector/block locations will be executed. Program command is executed on byte basis, or page (256 bytes) basis, or word basis. Erase command is executed on 4K-byte sector, 32K-byte block, or 64K-byte block, or whole chip basis.

To provide user with ease of interface, a status register is included to indicate the status of the chip. The status read command can be issued to detect completion status of a program or erase operation via WIP bit.

Advanced security features enhance the protection and security functions, please see security features section for more details.

The MX25V8035F utilizes Macronix's proprietary memory cell, which reliably stores memory contents even after 100,000 program and erase cycles.

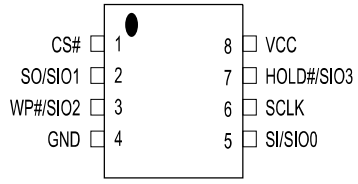
Table 1. Additional Feature

Protection and Security	MX25V8035F
Flexible Block Protection (BP0-BP3)	V
8K-bit security OTP	V

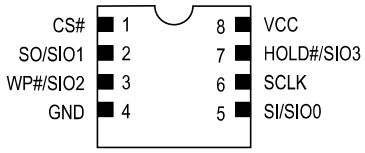
Fast Read Performance					
I/O	1 I/O	1I/2O	2 I/O	1I/4O	4 I/O
Dummy Cycle	8	8	4	8	6
Frequency	108MHz	104MHz	104MHz	104MHz	104MHz

3. PIN CONFIGURATIONS

8-PIN SOP (150mil/200mil)



8-LAND USON (2x3mm), WSON (6x5mm)

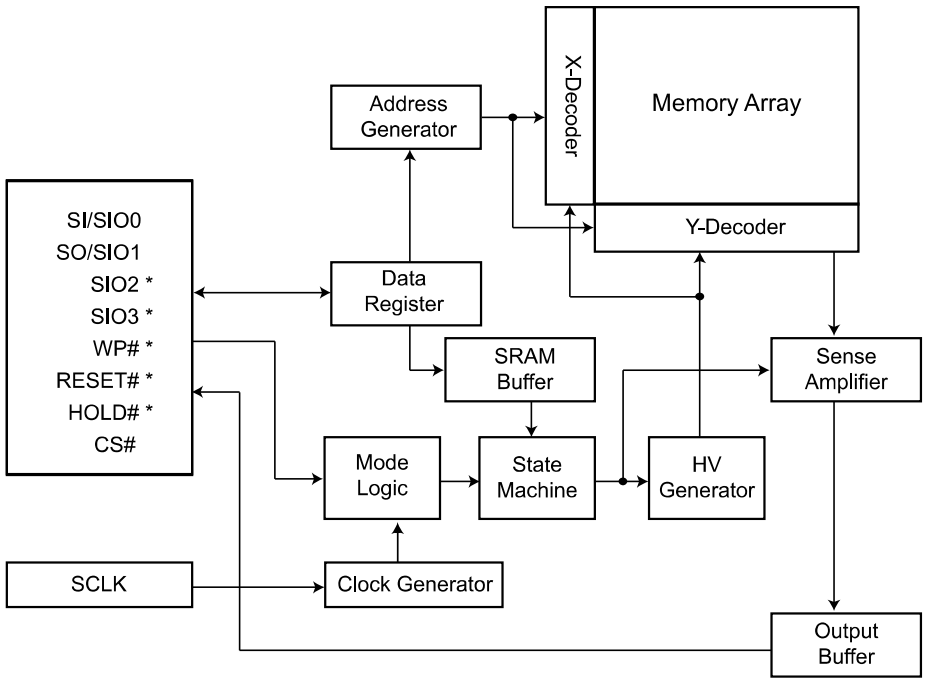


4. PIN DESCRIPTION

SYMBOL	DESCRIPTION
CS#	Chip Select
SI/SIO0	Serial Data Input (for 1 x I/O)/ Serial Data Input & Output (for 4xI/O read mode)
SO/SIO1	Serial Data Output (for 1 x I/O)/ Serial Data Input & Output (for 4xI/O read mode)
SCLK	Clock Input
WP#/SIO2	Write Protection Active Low or Serial Data Input & Output (for 4xI/O read mode)
HOLD#/SIO3	To pause the device without deselecting the device or Serial Data Input & Output (for 4xI/O read mode)
VCC	Power Supply
GND	Ground

Note: The pin of HOLD#/SIO3 or WP#/SIO2 will remain internal pull up function while this pin is not physically connected in system configuration. However, the internal pull up function will be disabled if the system has physical connection to HOLD#/SIO3 or WP#/SIO2 pin.

5. BLOCK DIAGRAM



* Depends on part number options.

6. DATA PROTECTION

During power transition, there may be some false system level signals which result in inadvertent erasure or programming. The device is designed to protect itself from these accidental write cycles.

The state machine will be reset as standby mode automatically during power up. In addition, the control register architecture of the device constrains that the memory contents can only be changed after specific command sequences have completed successfully.

In the following, there are several features to protect the system from the accidental write cycles during VCC power-up and power-down or from system noise.

- Power-on reset: to avoid sudden power switch by system power supply transition, the power-on reset may protect the Flash.
- Valid command length checking: The command length will be checked whether it is at byte base and completed on byte boundary.
- Write Enable (WREN) command: WREN command is required to set the Write Enable Latch bit (WEL) before issuing other commands to change data.
- Deep Power Down Mode: By entering deep power down mode, the flash device is under protected from writing all commands except toggling the CS#. For more detail please see *"10-24. Deep Power-down (DP)"*.
- Advanced Security Features: there are some protection and security features which protect content from inadvertent write and hostile access.

  I. Block lock protection

  - The Software Protected Mode (SPM) use (BP3, BP2, BP1, BP0) bits to allow part of memory to be protected as read only. The protected area definition is shown as *"Table 2. Protected Area Sizes"*, the protected areas are more flexible which may protect various area by setting value of BP0-BP3 bits.

  - The Hardware Protected Mode (HPM) use WP#/SIO2 to protect the (BP3, BP2, BP1, BP0) bits and Status Register Write Protect (SRWD) bit. If the system goes into four I/O mode, the feature of HPM will be disabled.

Table 2. Protected Area Sizes

Protected Area Sizes (TB bit = 0)

Status bit				Protect Level
BP3	BP2	BP1	BP0	8Mb
0	0	0	0	0 (none)
0	0	0	1	1 (1block, block 15th)
0	0	1	0	2 (2blocks, block 14th-15th)
0	0	1	1	3 (4blocks, block 12th-15th)
0	1	0	0	4 (8blocks, block 8th-15th)
0	1	0	1	5 (16blocks, protect all)
0	1	1	0	6 (16blocks, protect all)
0	1	1	1	7 (16blocks, protect all)
1	0	0	0	8 (16blocks, protect all)
1	0	0	1	9 (16blocks, protect all)
1	0	1	0	10 (16blocks, protect all)
1	0	1	1	11 (16blocks, protect all)
1	1	0	0	12 (16blocks, protect all)
1	1	0	1	13 (16blocks, protect all)
1	1	1	0	14 (16blocks, protect all)
1	1	1	1	15 (16blocks, protect all)

Protected Area Sizes (TB bit = 1)

Status bit				Protect Level
BP3	BP2	BP1	BP0	8Mb
0	0	0	0	0 (none)
0	0	0	1	1 (1block, block 0th)
0	0	1	0	2 (2blocks, block 0th-1st)
0	0	1	1	3 (4blocks, block 0th-3rd)
0	1	0	0	4 (8blocks, block 0th-7th)
0	1	0	1	5 (16blocks, protect all)
0	1	1	0	6 (16blocks, protect all)
0	1	1	1	7 (16blocks, protect all)
1	0	0	0	8 (16blocks, protect all)
1	0	0	1	9 (16blocks, protect all)
1	0	1	0	10 (16blocks, protect all)
1	0	1	1	11 (16blocks, protect all)
1	1	0	0	12 (16blocks, protect all)
1	1	0	1	13 (16blocks, protect all)
1	1	1	0	14 (16blocks, protect all)
1	1	1	1	15 (16blocks, protect all)

Note: The device is ready to accept a Chip Erase instruction if, and only if, all Block Protect (BP3, BP2, BP1, BP0) are 0.

II. Additional 8K-bit secured OTP for unique identifier: to provide 8K-bit One-Time Program area for setting device unique serial number - Which may be set by factory or system maker.

The 8K-bit secured OTP area is composed of two rows of 4K-bit. Customer could lock the first 4K-bit OTP area and factory could lock the other.

- Security register bit 0 indicates whether the 2nd 4K-bit is locked by factory or not.

- Customer may lock-down the customer lockable secured OTP by writing WRSCUR(write security register) command to set customer lock-down bit1 as "1". Please refer to table of *"Table 11. Security Register Definition"* for security register bit definition and table of *"Table 3. 8K-bit Secured OTP Definition"* for address range definition.

- To program 8K-bit secured OTP by entering secured OTP mode (with ENSO command), and going through normal program procedure, and then exiting secured OTP mode by writing EXSO command.

Note: Once lock-down whatever by factory or customer, the corresponding secured area cannot be changed any more. While in 8K-bit Secured OTP mode, array access is not allowed.

Table 3. 8K-bit Secured OTP Definition

Address range	Size	Lock-down
xxx000-xxx1FF	4096-bit	Determined by Customer
xxx200-xxx3FF	4096-bit	Determined by Factory