Comparison of MX25V8035F with MX25L8006E/08E and MX25V8006E

1. Introduction

This application note compares Macronix 8Mb 2.5V/3V Serial NOR Flash MX25V8035F with MX25L8035/06/08E and MX25V8006E. Generally, the MX25V8035F is backward compatible with MX25L8035/06/08E and MX25V8006E as it is pin and command compatible with the basic Read/Program/Erase commands. MX25V8035F provides wider voltage range and lower power consumption.

The comparison covers the general features, performance, command codes, and other differences. The document does not provide detailed information on individual devices, but highlights major differences. The information in this document is based on the latest datasheets listed in Section *"9. Reference"*. Newer versions of the datasheets may override the contents of this document.

2. General Features

Macronix 2.5V/3V 8Mb serial flash families have similar features and functions as shown in the table below. MX25V8035F provides wider voltage range and 4Kb x 2 of Secured OTP size.

For Block Protection, The MX25V8035F have the ability to write protect identical groups of blocks as MX25L8006E/08E and MX25V8006E, while MX25V8035F provides BP3~BP0 bit settings (MX25L8006E/08E and MX25V8006E provide BP2~0).

Table 2: Key Features Comparison

Part Name	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
Operation Voltage	2.3-3.6V	2.7-3.6V	2.7-3.6V	2.35-3.6V
Sector Size	4KB	4KB	4KB	4KB
Block Size	32KB/64KB	64KB	64KB	64KB
Page Size	256B	256B	256B	256B
SFDP	1.6	1.0	1.0	1.0
tVSL (Min.)	800us	200us	300us	200us
Endurance	100K (Min.)	100K (Typ.)	100K (Min.)	100K (Typ.)
Secured OTP Size	4Kb x 2	512b x 1	4Kb x 1	512b x 1
BP Bit Block Protection	BP3~BP0	BP2~BP0	BP3~BP0	BP2~BP0

3. Electrical Performance

The MX25V8035F is capable of similar or improved performance with MX25L8035/06/08E and MX25V8006E:

Table 3-1: Operation Frequency

Part Name	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
1-1-1 (READ)	33MHz	33MHz	50MHz	33MHz
1-1-1 (FAST_READ)	104MHz	86MHz	108MHz	75MHz
1-1-2 (DREAD)	104MHz	80MHz	--	70MHz
1-2-2 (2READ)	104MHz	--	80MHz (2.7-3.6V) 104MHz (3.0-3.6V)	--
1-1-4 (QREAD)	104MHz	--	--	--
1-4-4 (4READ)	104MHz	--	108MHz	--

Table 3-2: AC Characteristics

Part Name	Condition	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
Page Program Time (tPP)	Typ./Max.	0.8ms/4ms	0.6ms/3ms	0.7ms/3ms	0.6ms/3ms
Byte Program Time (tBP)	Typ./Max.	30us/100us	9us/50us	9us/300us	9us/50us
Sector Erase Time (tSE)	Typ./Max.	38ms/240ms	40ms/200ms	60ms/300ms	40ms/200ms
Block Erase (tBE32K)	Typ./Max.	0.225s/1.5s	--	--	--
Block Erase (tBE)	Typ./Max.	0.45s/3s	0.4s/2s	0.4s/2.2s	0.4s/2s
Chip Erase Time (tCE)	Typ./Max.	5.6s/18s	3.5s/6s	3s/15s	3.5s/6s
Write Status Register Cycle Time	Max.	30ms	40ms	100ms	40ms
tCLQV	30pf/15pf (Max.)	8ns/6ns	8ns/6ns	9ns/8ns	8ns/6ns

Table 3-3: DC Characteristics

Part Name	Condition	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
Standby Current (ISB1)	Typ./Max.	9uA/40uA	15uA/25uA	20uA/50uA	15uA/25uA
Deep Power Down Current (ISB2)	Typ./Max.	0.1uA/0.5uA	2uA/10uA	3uA/20uA	2uA/10uA
Read Current (x 1 I/O) (ICC1)	Max.	6.5mA (104MHz)	4mA (33MHz)	10mA (50MHz)	4mA (33MHz)
Program Current (ICC2)	Typ.	5.8mA	15mA	--	15mA
	Max.	10mA	20mA	20mA	20mA
Sector Erase Current (ICC4)	Typ.	3.5mA	9mA	--	9mA
	Max.	10mA	15mA	20mA	15mA
Chip Erase Current (ICC5)	Typ.	4mA	15mA	--	15mA
	Max.	10mA	20mA	20mA	20mA
Write Status Register Current (ICC3)	Typ.	3.5mA	3mA	--	3mA
	Max.	10mA	15mA	20mA	15mA

4. Command Set

Command Set Table shows basic Read, Program, and Erase commands are supported by the MX25V8035F with the same command codes of MX25L8035/06/08E/MX25V8006E. The differences are also highlighted in the following table.

Table 4: Command Set Table

Part Number	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
WREN	06h	06h	06h	06h
WRDI	04h	04h	04h	04h
RDID	9Fh	9Fh	9Fh	9Fh
RDSR	05h	05h	05h	05h
WRSR	01h	01h	01h	01h
1-1-1 READ	03h	03h	03h	03h
1-1-1 FAST READ	0Bh	0Bh	0Bh	0Bh
1-1-2 DREAD	3Bh	3Bh	--	3Bh
1-2-2 2READ	BBh	--	BBh	--
1-1-4 QREAD	6Bh	--	--	--
1-4-4 4READ	EBh	--	EBh	--
Page Program	02h	02h	02h	02h
Sector Erase	20h	20h	20h	20h
Block Erase (32KB)	52h	--	--	--
Block Erase (64KB)	D8h	52h or D8h	D8h	52h or D8h
Chip Erase	60h or C7h	60h or C7h	60h or C7h	60h or C7h
Deep Power Down	B9h	B9h	B9h	B9h
Release from Deep Power Down	CS# toggle	ABh	ABh	ABh
RDSFDP	5Ah	5Ah	--	5Ah
RDCR	15h	--	--	--
Program / Erase Suspend	75h or B0h	--	--	--
Program / Erase Resume	7Ah or 30h	--	--	--
RSTEN	66h	--	--	--
RST	99h	--	--	--
ENSO (Enter secured OTP)	B1h	B1h	B1h	B1h
EXSO (Exit secured OTP)	C1h	C1h	C1h	C1h
RDSCUR	2Bh	2Bh	2Bh	2Bh
WRSCUR	2Fh	2Fh	2Fh	2Fh

5. Register Comparison

The MX25V8035F Status Register bits are backward compatible with the registers of the MX25L8035/06/08E and MX25V8006E, MX25V8035F has Configuration Register to provide more flexible block protection.

Table 5-1: Status Register Bits

Part Number	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
Bit 0	WIP	WIP	WIP	WIP
Bit 1	WEL	WEL	WEL	WEL
Bit 2	BP0	BP0	BP0	BP0
Bit 3	BP1	BP1	BP1	BP1
Bit 4	BP2	BP2	BP2	BP2
Bit 5	BP3	--	BP3	--
Bit 6	QE	--	QE	--
Bit 7	SRWD Status Register Write Protect	SRWD Status Register Write Protect	SRWD Status Register Write Protect	SRWD Status Register Write Protect

Table 5-2: Configuration Register Bits

Part Number	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
Bit 0	--	--	--	--
Bit 1	--	--	--	--
Bit 2	--	--	--	--
Bit 3	TB (top/bottom selected)	--	--	--
Bit 4	--	--	--	--
Bit 5	--	--	--	--
Bit 6	--	--	--	--
Bit 7	--	--	--	--

Table 5-3: Security Register Bits

Part Number	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
Bit 0	Secured OTP Indicator bit (2nd 4Kb Secured OTP) 0=nonfactory lock, 1= factory lock	Secured OTP Indicator bit (0=non factory lock, 1= factory lock)	Secured OTP Indicator bit (0=non factory lock, 1= factory lock)	Secured OTP Indicator bit (0=non factory lock, 1= factory lock)
Bit 1	LDSO (Lock-Down 1st 4Kb Secured OTP) 0= not lockdown, 1= lockdown	LDSO (0= not lockdown, 1= lockdown)	LDSO (0= not lockdown, 1= lockdown)	LDSO (0= not lockdown, 1= lockdown)
Bit 2	PSB (Program Suspend status)	--	--	--
Bit 3	ESB (Erase Suspend status)	--	--	--
Bit 4	--	--	--	--
Bit 5	P_FAIL	--	--	--
Bit 6	E_FAIL	--	--	--
Bit 7	--	--	--	--

6. Package Comparison

For detailed package information, please refer to the individual datasheet.

Table 6: Package Comparison

Part Number	MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
150mil 8SOP	Y	Y	Y	Y
200mil 8SOP	Y	Y	Y	
150mil VSOP				Y
2x3 8USON	Y			
4x4 8USON		Y		
6x5 8WSON	Y	Y		Y

7. Device Identification

The RDID instruction is for reading the 1-byte Manufacturer ID followed by the 2-byte Device ID. The REMS instruction provides both the JEDEC assigned manufacturer ID and the specific Device ID.

Table 7: ID Code Comparison

Part Number		MX25V8035F	MX25L8006E MX25L8008E	MX25L8035E	MX25V8006E
RDID	Manufacturer ID	C2 h	C2 h	C2 h	C2 h
	Memory Type	23 h	20 h	20 h	20 h
	Memory Density	14 h	14 h	14 h	14 h
REMS	Manufacturer ID	C2 h	C2 h	C2 h	C2 h
	Device ID	14 h	13 h	13 h	13 h

8. BP bit Block Protection

All of the listed Macronix flash use BP bits to select groups of memory areas for write protection.

All the regions protected by the MX25L8006E/08E/MX25V8006E can be protected by MX25V8035F. The MX25V8035F have the ability to write protect identical groups of blocks as MX25L8006E/08E and MX25V8006E, while MX25V8035F provides BP3~BP0 bit settings (MX25L8006E/08E and MX25V8006E provide BP2~0). The difference protected regions are compared in the following table.

Table 8-1: Block Protection (BP) with T/B bit = 0

Status Register Bit				Protected Blocks		Status Register Bit			Protected Blocks	
BP3	BP2	BP1	BP0	MX25V8035F	MX25L8035E	BP2	BP1	BP0	MX25L8006E MX25L8008E	MX25V8006E
0	0	0	0	None	None	0	0	0	None	None
0	0	0	1	1 block (#15)	1 block (#15)	0	0	1	1 block (#15)	1 block (#15)
0	0	1	0	2 blocks (#15-14)	2 blocks (#15-14)	0	1	0	2 blocks (#15-14)	2 blocks (#15-14)
0	0	1	1	4 blocks (#15-12)	4 blocks (#15-12)	0	1	1	4 blocks (#15-12)	4 blocks (#15-12)
0	1	0	0	8 blocks (#15-8)	8 blocks (#15-8)	1	0	0	8 blocks (#15-8)	8 blocks (#15-8)
0	1	0	1	16 blocks (all)	16 blocks (all)	1	0	1	16 blocks (all)	16 blocks (all)
0	1	1	0	16 blocks (all)	16 blocks (all)	1	1	0	16 blocks (all)	16 blocks (all)
0	1	1	1	16 blocks (all)	16 blocks (all)	1	1	1	16 blocks (all)	16 blocks (all)
1	0	0	0	16 blocks (all)	16 blocks (all)	--	--	--	--	--
1	0	0	1	16 blocks (all)	16 blocks (all)	--	--	--	--	--
1	0	1	0	16 blocks (all)	16 blocks (all)	--	--	--	--	--
1	0	1	1	16 blocks (all)	8 blocks (#0-7)	--	--	--	--	--
1	1	0	0	16 blocks (all)	12 blocks (#0-11)	--	--	--	--	--
1	1	0	1	16 blocks (all)	14 blocks (#0-13)	--	--	--	--	--
1	1	1	0	16 blocks (all)	15 block (#0-14)	--	--	--	--	--
1	1	1	1	16 blocks (all)	15 (16blocks, all)	--	--	--	--	--

9. Reference

The table below shows the datasheet versions used for comparison in this application note. For the most current, detailed specification, please refer to the Macronix Website at http://www.macronix.com/ or contact Macronix sales.

Table 9. Datasheet Versions

Datasheet	Location	Date Issued	Versions
MX25V8035F	Website	SEP. 30, 2015	0.04
MX25L8006E	Website	OCT. 16, 2014	1.5
MX25L8008E	Website	OCT. 24, 2014	1.3
MX25L8035E	Website	JUL. 01, 2014	1.4
MX25V8006E	Website	DEC. 11, 2014	1.6

10. Revision History

Table 10. Revision History

Revision No.	Description	Page	Date
REV. 1	Initial Release	ALL	OCT. 26, 2015

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