Macronix MX25L6435E and MX25L6436E Serial Flash Comparison

1. Introduction

This application note compares the MX25L6435E and MX25L6436E 64Mb 3V serial NOR flash. The document does not provide detailed information on each individual device, but highlights the similarities and differences between them. The comparison covers the general features, performance, command sets and device ID.

In comparison with the MX25L6436E, the MX25L6435E supports new features, such as 2READ mode (1-2-2, Single I/O Command input - Dual I/O Address input - Dual I/O Data output) and 4READ mode (1-4-4, Single I/O Command input - Quad I/O Address input - Quad I/O Data output).

MX25L6435E supports a new TB (Top/Bottom) bit function, which enables Block Protection beginning at either the top or bottom of the memory array.

The MX25L6435E also has a HOLD pin added and is available in not only the 8-SOP and 16-SOP packages, but comes in a smaller 8-WSON package and a 24-TFBGA package as well.

The information provided in this document is based on datasheets listed in Section 8. Newer versions of the datasheets may override the contents of this document.

Please refer to the contents and comparison tables below for more details.

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2. General Features

The MX25L6435E has a new TB (Top/Bottom) bit located in Configuration Register Bit 3. By controlling the T/B bit, memory blocks can be selected for protection beginning at either the top or bottom of the memory array.
The MX25L6435E supports two additional read modes: 2READ mode and 4READ mode. The MX25L6435E has the same or improved performance in all read modes.
The MX25L6435E also has a HOLD pin added and is available in not only the 8-SOP and 16-SOP packages, but comes in a smaller 8-WSON and 24-TFBGA packages as well.
These features are summarized in Table 2-1.

Table 2-1: Feature Comparison

Feature		MX25L6435E	MX25L6436E
Voltage		2.7~3.6 V	2.7~3.6 V
Interface		x1, x2, x4	x1, x2, x4
Packages		16-SOP (300mil) 8-SOP (209mil) 8-WSON (6x5mm) 24-TFBGA (6x8mm)	16-SOP (300mil) 8-SOP (209mil) 8-WSON (8x6mm)
Operating Temperature Range		-40°C ~ +85°C	-40°C ~ +85°C
Sector / Block		4KB / 32KB or 64KB	4KB / 32KB or 64KB
Clock Rate (max.)	Fast Read (1-1-1)	104MHz	104MHz
	Normal Read	50MHz	50MHz
	DREAD (1-1-2) (Dual Output)	86MHz	70MHz
	QREAD (1-1-4) (Quad Output)	86MHz	75MHz
	2READ(1-2-2)	86MHz	--
	4READ(1-4-4)	Up to 104MHz	--
	4PP	104MHz	20MHz
Configurable Dummy Cycle		Yes. for 4READ mode only	--
Continuous Program (CP) Mode		Yes	Yes
Data Protection	Secured OTP	4Kbits	4Kbits
	Block Protection	BP3~BP0	BP3~BP0
	T/B (Top/Bottom)bit	Yes	--
	Individual Protection	Individual Sector/Block Protect	Individual Sector/Block Protect
HOLD#		Yes	--
SFDP		Yes	Yes

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3. Performance

Both devices have similar power and timing as shown in Table 3-1.

Table 3-1: Performance Comparison

Parameter	Symbol	MX25L6435E	MX25L6436E
Clock High/Low Time	tCH	104MHz: 4.5ns 50MHz: 9ns	104MHz: 4.5ns 50MHz: 9ns
	tCL	104MHz: 4.5ns 50MHz: 9ns	104MHz: 4.5ns 50MHz: 9ns
Program Time	Byte	12us(typ.) ; 300us(max.)	9us(typ.) ; 300us(max.)
	Page	1.4ms(typ.) ; 5ms(max.)	1.4ms(typ.) ; 5ms(max.)
Erase Time	Sector	60ms(typ.) ; 300ms(max.)	60ms(typ.) ; 300ms(max.)
	Block	32KB:0.5s(typ.); 2s(max.) 64KB:0.7s(typ.); 2s(max.)	32KB:0.5s(typ.); 2s(max.) 64KB:0.7s(typ.); 2s(max.)
	Chip	50s (typ.) / 80s(max.)	50s (typ.) / 80s(max.)
CS# Active Setup Time	tSLCH	4ns(min.)	5ns(min.)
CS# Not Active Setup Time	tSHCH	4ns(min.)	5ns(min.)
CS# Active Hold Time	tCHSH	4ns(min.)	5ns(min.)
CS# Not Active Hold Time	tCHSL	4ns(min.)	5ns(min.)
CS# Deselect Time	tSHSL	Read=15ns(min.) ; Write=50ns(min.)	Read=15ns(min.) ; Write=50ns(min.)
VCC Standby	ISB1	80uA(max.)	50uA(max.)
Deep Power Down	ISB2	40uA(max.)	20uA(max.)
VCC Read Current	ICC1	35mA (104MHz, 4 I/O) 25mA (86MHz, 4 I/O) 19mA (104MHz, 1 I/O) 20mA (86MHz, 2 I/O) 10mA (33MHz, 1 I/O)	22mA (75MHz, 4 I/O) 19mA (104MHz, 1 1/O) 17mA (70MHz, 2 I/O) 10mA (33MHz, 1 I/O)
VCC Program Current	ICC2	25mA	25mA
VCC WRSR Current	ICC3	20mA	20mA
VCC Sector Erase Current	ICC4	25mA	25mA
VCC Chip Erase Current	ICC5	25mA	20mA

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4. Package and Pin-out Comparison

Figure 4-1 shows the common packages and the pin-out assignments for the two devices. With the exception of the added HOLD# pin function on the MX25L6435E, both devices have the same footprint and pinout. When migrating from the 36E to the 35E, if the HOLD#/SIO3 pin is currently N/C (not connected) it can be left unconnected as the HOLD# pin is internal pull high.

Figure 4-1: Packages and Pin-outs

16-PIN SOP (300mil)

MX25L6435E	MX25L6436E		MX25L6435E	MX25L6436E
HOLD#/SIO3	NC/SIO3	1 16	SCLK	SCLK
VCC	VCC	2 15	SI/SIO0	SI/SIO0
NC	NC	3 14	NC	NC
NC	NC	4 13	NC	NC
NC	NC	5 12	NC	NC
NC	NC	6 11	NC	NC
CS#	CS#	7 10	GND	GND
SO/SIO1	SO/SIO1	8 9	WP#/SIO2	WP#/SIO2

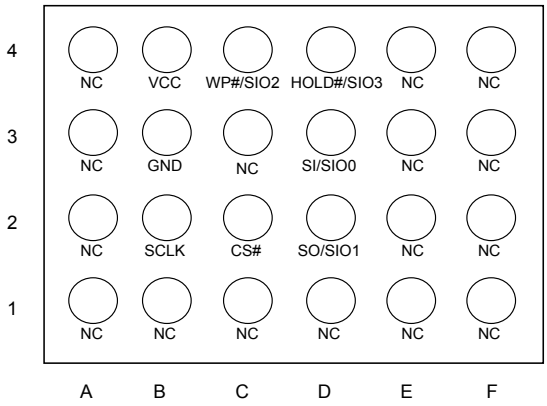
8-PIN SOP (200mil)

MX25L6435E	MX25L6436E		MX25L6435E	MX25L6436E
CS#	CS#	1 8	VCC	VCC
SO/SIO1	SO/SIO1	2 7	HOLD#/SIO3	NC/SIO3
WP#/SIO2	WP#/SIO2	3 6	SCLK	SCLK
GND	GND	4 5	SI/SIO0	SI/SIO0

8-WSON

MX25L6435E	MX25L6436E		MX25L6435E	MX25L6436E
CS#	CS#	1 8	VCC	VCC
SO/SIO1	SO/SIO1	2 7	HOLD#/SIO3	NC/SIO3
WP#/SIO2	WP#/SIO2	3 6	SCLK	SCLK
GND	GND	4 5	SI/SIO0	SI/SIO0

24-Ball TFBGA (6x8 mm) (MX25L6435E only)



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5. Command Set Comparison

Table 5-1 shows that the command set remain the same with the exception of the additional 2READ and 4READ (BBh and EBh, added to the 35E). The MX25L6435E does not have the Clear Security Register Fail Flags command (30h) to clear the E_FAIL or P_FAIL flags as the MX25L6436E does. The MX25L6435E clears these flags automatically at the beginning of the next command sequence.

Table 5-1: Command Set Comparison

Command		MX25L6435E	MX25L6436E
Write	WREN	06h	06h
	WRDI	04h	04h
	WRSR	01h	01h
Read	RDID	9Fh	9Fh
	RDSR	05h	05h
	READ	03h	03h
	RDSFDP	5A	5A
	Fast Read	0Bh	0Bh
	2READ	BBh	--
	4READ	EBh	--
	DREAD	3Bh	38h
	QREAD	6Bh	6Bh
	RES	Abh	Abh
	REMS	90h	90h
	REMS2	EFh	EFh
	REMS4	DFh	DFh
Erase	SE	20h	20h
	BE	D8h	D8h
	BE32K	52h	52h
	CE	60h or C7h	60h or C7h
Program	4PP	38h	38h
	PP	02h	02h
	CP	ADh	ADh
Security Register	RDSCUR	2Bh	2Bh
	WRSCUR	2Fh	2Fh
Secured OTP	ENSO	B1h	B1h
	EXSO	C1h	C1h
SO output	ESRY	70h	70h
	DSRY	80h	80h
Deep Power Down	DP	B9h	B9h
	RDP	ABh	ABh
Block Lock	SBLK	36h	36h
	SBULK	39h	39h
	GBLK	7Eh	7Eh
	GBULK	98h	98h
Clear SR	CLSR	--	30h
Block Protect Read	RDBLOCK	3Ch	3Ch

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6. Device ID Code Comparison

Table 6-1 shows that the Manufacturer and Device IDs have not changed.

Table 6-1: ID Code Comparison

Command Type	MX25L6435E			MX25L6436E		
RDID Command	M ID	Type	Density	M ID	Type	Density
	C2	20	17	C2	20	17
RES Command	Electronic ID			Electronic ID		
	16			16		
REMS	M ID	Device ID		M ID	Device ID	
	C2	16		C2	16	

7. Summary

The MX25L6435E is backwards compatible with most of the common commands and features of the MX25L6436E. Additionally, the supported package types have identical footprints and nearly identical pin-out definitions.

8. References

Table 8-1 shows the datasheet versions used for comparison in this application note. For the most current Macronix specification, please refer to the Macronix Website at http://www.macronix.com

Table 8-1: Datasheet Version

Datasheet	Location	Date Issued	Version
MX25L6435E	Macronix Website	Sep. 2012	1.0
MX25L6436E	Macronix Website	Apr. 2010	1.9

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