

Migrating from MX30LF1G08AA to MX30LF1GE8AB

1. Introduction

This application note is a guide for migrating the Macronix MX30LF1G08AA to the MX30LF1GE8AB. The document does not provide detailed information on the individual devices, but highlights the major similarities and differences between them. The comparison covers the general features, performance, command codes and other differences.

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

2. General Features

Both flash device families have similar features and functions as shown in **Table 2-1**. Feature differences are highlighted in ***Bold Italic*** type in the table.

Table 2-1. Key Feature Comparison

Part Name	MX30LF1G08AA	MX30LF1GE8AB
Voltage	2.7V~3.6V	2.7V~3.6V
Bus Width	x8	x8
Operating Temperature	-40°C~85°C	-40°C~85°C
Interface	--	<i>ONFI 1.0 Compliant</i>
Page Size	(2K+64)B	(2K+64)B
Block Size	(128K +4K)B	(128K +4K)B
Cache Read ^(note)	(2K+64)B	<i>N/A</i>
Cache Program	(2K+64)B	(2K+64)B
ECC requirement	1bit/528B	<i>External ECC generation is not required as this Flash has the ability to generate and check ECC internally.</i>
OTP	--	<i>30 Pages</i>
Unique ID	--	<i>ONFI Standard</i>
Guaranteed Good Blocks at Shipping	Block#0	Block#0
Data Retention	10 Years	10 Years
Endurance	100K Cycles	100K Cycles
Packages	48TSOP (12x20mm) 63-VFBGA (9x11mm)	<i>48TSOP (12x20mm)</i>

Note: The MX30LF1GE8AB does not support the Cache Read operation.

3. Electrical Performance

Both flash device families have similar performance as shown in Table 3-1. However, the Read Latency time (tR_ECC) of the MX30LF1GE8AB is longer because of the internal ECC processing time. Performance differences are highlighted in ***Bold Italic*** type in the table.

Table 3-1. Key Performance Comparison

Part Name		MX30LF1G08AA			MX30LF1GE8AB		
Performance		Min.	Typ.	Max.	Min.	Typ.	Max.
Access Time	Random (tR)	-	-	25us	-	<i>45us</i>	<i>70us</i>
	Cache Read Busy time (note)	-	-	5us	-	--	--
	Sequential(tRC)	30ns	-	-	<i>20ns</i>	-	-
Program Time	Page Program	-	250us	700us	-	<i>320us</i>	<i>600us</i>
	Cache Program Busy time	-	4us	700us	-	<i>25us</i>	<i>600us</i>
Erase Time	Block	-	2ms	3ms	-	<i>1ms</i>	<i>3.5ms</i>
Current Consumption	Standby (TTL)	-	-	1mA	-	-	1mA
	Standby (CMOS)	-	10uA	50uA	-	10uA	50uA
	Active Read	-	15mA	30mA	-	<i>20mA</i>	30mA
	Active Program	-	15mA	30mA	-	<i>20mA</i>	30mA
	Active Erase	-	15mA	30mA	-	15mA	30mA
	Power-up Current (Including POR Current)	-	-	-	-	-	30mA
	Input Leakage	-	-	+/- 10uA	-	-	+/- 10uA
	Output Leakage	-	-	+/- 10uA	-	-	+/- 10uA
Partial-Page Programs	NOP	-	-	4 cycles	-	-	4 cycles

Note: The Cache Read Operation is different for both devices; please refer to the individual datasheets

4. Command Set

Command sets are similar as shown in Table 4-1. Command differences are highlighted in ***Bold Italic*** type in the table.

Table 4-1. Command Set

Part Name	MX30LF1G08AA		MX30LF1GE8AB	
Command Description	1st cmd Cycle	2nd cmd Cycle	1st cmd Cycle	2nd cmd Cycle
Read	00h	30h	00h	30h
Random Data Input	85h	-	85h	-
Random Read Data Output	05h	E0h	05h	E0h
Cache Read Begin ^(note)	00h	31h	-	-
Cache Read End ^(note)	34h	-	-	-
Read ID	90h	-	90h	-
Parameter Page Read (ONFI)	-	-	<i>ECh</i>	-
Read Unique ID (ONFI)	-	-	<i>EDh</i>	-
Get Features (ONFI)	-	-	<i>EEh</i>	-
Set Features (ONFI)	-	-	<i>EFh</i>	-
Reset	FFh	-	FFh	-
Page Program	80h	10h	80h	10h
Cache Program	80h	15h	80h	15h
Block Erase	60h	D0h	60h	D0h
Read Status Resister	70h	-	70h	-
OTP Area Access	-		<i>Set Feature followed by normal read/program command</i>	

Note: The MX30LF1GE8AB does not support the Cache Read operation.

5. Status Register Comparison

Status Register bit functions are the similar (Table 5-1) except the MX30LF1GE8AB uses SR[4:3] and SR[0] to report Internal ECC status after page reads. Table 5-2 shows the encoding of the ECC status bits. Please refer to the Macronix datasheet for additional details.

Table 5-1. Status Register Comparison

Part Number	MX30LF1G08AA	MX30LF1GE8AB
SR[0]	Program/Erase Pass or Fail	Program/Erase Pass or Fail, <i>ECC status for current output page</i>
SR[1]	Cache Program Pass or Fail	Cache Program Pass or Fail
SR[2]	Not Used	Not Used
SR[3]	Not Used	<i>See ECC Status of Table 5-2</i>
SR[4]	Not Used	<i>See ECC Status of Table 5-2</i>
SR[5]	Ready/Busy for Internal Controller Program/Erase/Read Operation	Ready/Busy for Internal Controller Program/Erase/Read Operation
SR[6]	Ready/Busy	Ready/Busy
SR[7]	Write Protect	Write Protect

Table 5-2. ECC Status for MX30LF1GE8AB

SR Bits and Value			Status of Error Bits Correction
SR[4]	SR[3]	SR[0]	
0	0	1	Uncorrectable
0	0	0	0 or 1-bit error corrected
1	0	0	2-bit error corrected
0	1	0	3-bit error corrected
1	1	0	4-bit error corrected

6. Package Pin Definition- 48TSOP

The MX30LF1G08AA can be replaced by the MX30LF1GE8AB without pin conflicts. Some VCC and VSS pins of the MX30LF1GE8AB are included for ONFI compatibility, but they are not bonded internally.

Package physical dimensions are the same. For detailed information, please refer to the individual datasheets.

Table 6-1. 48-TSOP Package Pin Definition

Part Name	MX30LF1G08AA	MX30LF1GE8AB	Note
#25, #48	NC	VSS	MX30LF1GE8AB pins 25 and 48 are not bonded internally.
#34, #39	NC	VCC	MX30LF1GE8AB pins 34 and 39 are not bonded internally.
#38	NC	DNU	If pins are left unconnected, both pin functions are compatible.
#35	DNU	NC	If pins are left unconnected, both pin functions are compatible

7. Device Identification

The Device ID lengths of the MX30LF1G08AA and the MX30LF1GE8AB differ by one byte. The ID of the MX30LF1G08AA begins with a one-byte Manufacturer Code followed by a three-byte Device ID. The ID of the MX30LF1GE8AB begins with a one-byte Manufacturer Code followed by a four-byte Device ID. The ID codes of the MX30LF1G08AA and the MX30LF1GE8AB are identical except for the last two bytes for Sequential Read Cycle time and the ECC requirement (**Table 7-1 Device Identification**).

The MX30LF1G08AA Device ID repeats after the 4th byte (i.e. C2h/F1h/80h/1Dh/C2h/F1h/80h/1Dh). The MX30LF1GE8AB Device ID repeats after the 8th byte and returns 00h for the 6th through 8th bytes (i.e. C2h/F1h/80h/95h/82h/00h/00h/00h/C2h/F1h/80h/95h/82h).

Table 7-1. Device Identification

Part Name			MX30LF1G08AA	MX30LF1GE8AB
ID Code			C2h/F1h/80h/ 1Dh	C2h/F1h/80h/ 95h/82h
ID Definition	1st Byte		Manufacturer ID	Manufacturer ID
	2nd Byte		Device ID	Device ID
	3rd Byte	bit 1- 0	Number of Die per CE	Number of Die per CE
		bit 3 - 2	Cell Structure	Cell Structure
		bit 5 - 4	Number of Concurrently Programmed Pages	Number of Concurrently Programmed Pages
		bit 6	Interleaved Programming between multiple devices	Interleaved Programming between multiple devices
		bit 7	Cache program	Cache program
	4th Byte	bit 1- 0	Page Size	Page Size (Excluding spare area)
		bit 2	Spare Area Size	Spare Area Size
		bit 7, 3	Sequential Read Cycle Time, (bit7, bit3= 0,1)	Sequential Read Cycle Time (bit7, bit3= 1,0)
		bit 5 - 4	Block Size (Excluding spare area)	Block Size (Excluding spare area)
		bit 6	Organization	Organization
	5th Byte	bit 1- 0	-	ECC level requirement, 4-bit ECC required (bit1:0=10b)
		bit 3 - 2	-	Number of Planes per CE
		bit 6 - 4	-	Plane Size
		bit 7	-	Internal ECC state: ECC enabled (bit7=1)

8. Reference

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

Table 8-1. Datasheet Versions

Datasheet	Location	Date Issued	Revision
MX30LF1G08AA	Website	Sept. 2014	Rev. 1.5
MX30LF1GE8AB	Website	Sept. 2014	Rev. 0.03

9. Summary

The Macronix MX30LF1G08AA and MX30LF1GE8AB NAND flash share the same basic Read, Program, and Erase commands and have compatible pin-outs. The cache read operation is not supported on the MX30LF1GE8AB. Migrating from the MX30LF1G08AA to the MX30LF1GE8AB may require software modification because the MX30L1GE8AB has a longer Device ID and a longer tR (Random Read Access) time.

10. Part Number Cross-Reference

Table 10-1. Part Number Cross Reference

Bus Width	Voltage	Package	Part Number	Migrating Part Number
x8	3V	48-TSOP	MX30LF1G08AA-TI	MX30LF1GE8AB-TI
		63-VFBGA	MX30LF1G08AA-XKI	N/A

11. Revision History

Table 11-1. Revision History

Revision No.	Description	Page	Date
REV. 1	Initial Release	ALL	MAR. 10, 2015

Except for customized products which have been expressly identified in the applicable agreement, Macronix's products are designed, developed, and/or manufactured for ordinary business, industrial, personal, and/or household applications only, and not for use in any applications which may, directly or indirectly, cause death, personal injury, or severe property damages. In the event Macronix products are used in contradicted to their target usage above, the buyer shall take any and all actions to ensure said Macronix's product qualified for its actual use in accordance with the applicable laws and regulations; and Macronix as well as it's suppliers and/or distributors shall be released from any and all liability arisen therefrom.

Copyright© Macronix International Co., Ltd. 2015. All rights reserved, including the trademarks and tradename thereof, such as Macronix, MXIC, MXIC Logo, MX Logo, Integrated Solutions Provider, NBit, Nbit, NBit, Macronix NBit, eLite-Flash, HybridNVM, HybridFlash, XtraROM, Phines, KH Logo, BE-SONOS, KSMC, Kingtech, MXSMIO, Macronix vEE, Macronix MAP, Rich Audio, Rich Book, Rich TV, and FitCAM. The names and brands of third party referred thereto (if any) are for identification purposes only.

For the contact and order information, please visit Macronix's Web site at: <http://www.macronix.com>