



**Migration Guide:
Numonyx™ M29W128G Flash to
Numonyx™ 28F256M29EW Flash**

Application Note - 308003

Oct 2008

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TABLE OF CONTENTS

1.0	INTRODUCTION.....	5
2.0	CONVERSION FROM M29W128G TO 28F256M29EW.....	5
2.1	HARDWARE CONSIDERATIONS	6
2.1.1	A23 Pin Considerations	6
2.1.2	BGA Package Mechanical Difference.....	8
2.1.3	12V V_{HH} Application	9
2.1.4	I_{CCS} Difference.....	9
2.2	PERFORMANCE DIFFERENCES	9
2.2.1	Random Access Time difference	9
2.2.2	Read / Write Buffer Size	10
2.2.3	Power-on Timing Sequence.....	10
2.3	SOFTWARE CONSIDERATIONS	11
2.3.1	Manufacturer ID and Device Code	11
2.3.2	CFI Read Difference in x8 Mode	12
2.3.3	Enhanced Buffered Program Command.....	12
2.3.4	Password Access.....	13
	APPENDIX A ADDITIONAL INFORMATION.....	14

REVISION HISTORY

Date of Revision	Revision	Description
Sept 2008	Rev0	Initial Release
Oct 2008	Rev1	Minor wording changes Remove Chapter 3 Conclusion

1.0 Introduction

This application note describes how to upgrade a system design from Numonyx™ 128Mbit M29W128G Flash to Numonyx™ 256Mbit 28F256M29EW Flash.

This document was written based on device information available at the time. The M29EW Datasheet may override this application note if there is a different description for the same items in the datasheet.

2.0 Conversion from M29W128G to 28F256M29EW

The 28F256M29EW flash memory device is a pin compatible device for the M29W128G 90nm flash memory device on the 65nm lithography. The table below is a major feature comparison between the two devices.

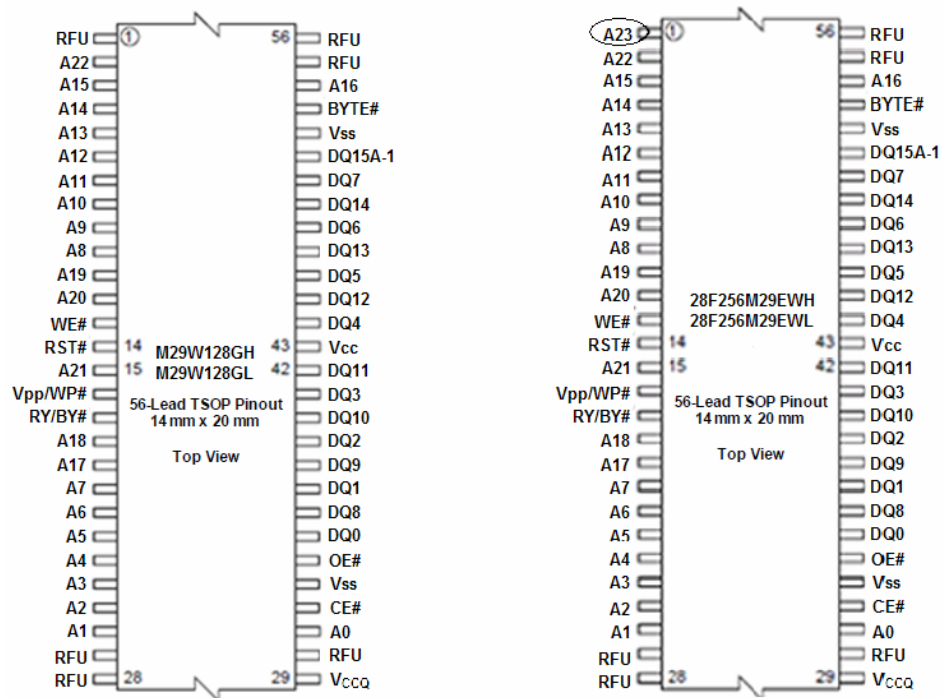
Features	28F256M29EW	M29W128G
Process Technology	65nm	90nm
Package	64-Fortified BGA 56-TSOP	64-TBGA 56-TSOP
Block Architecture	64KWord x16 mode 128KB x8 mode Uniformed	64KWord x16 mode 128KB x8 mode Uniformed
Page Read Size	16 Words	8 Words
Program Buffer Size	512 Words	32 Words
Average Typical Program Speed with full buffer	1.36µS per Word	2.44µS per Word
Random Access Time	1.8V V _{CCQ} : 100nS 3.0V V _{CCQ} : 100nS	1.8V V _{CCQ} : 80nS 3.0V V _{CCQ} : 70nS
Extended Memory Block	128 Words	128 Words
Support for Common Flash Interface	Yes	Yes
Hardware Protection of Top or Bottom Sectors	Yes	Yes
Software Protect and Password Protect	Yes	Yes
Password Access	Yes	No

2.1 Hardware Considerations

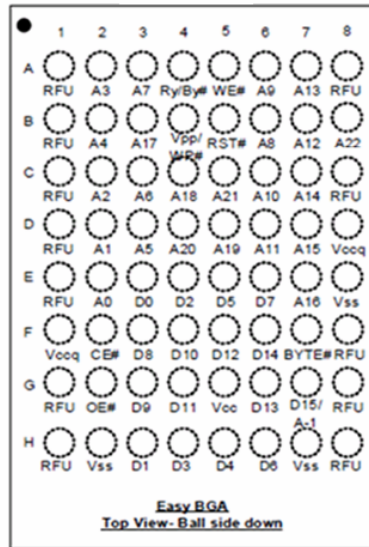
The 28F256M29EW is supported in two packages, the 56-TSOP and the 64-Fortified BGA package configurations. In order to ensure compatibility, the Pin/Ball layouts and pad definitions are equivalent to that of the M29W128G Flash device.

2.1.1 A23 Pin Considerations

The 28F256M29EW device contains 256Mbits vs. the M29W128G which contains 128Mbits. Therefore, 28F256M29EW uses A23 pin as the highest address pin while M29W128G uses A22 pin as the highest address pin. Make sure connect A23 pin to the system bus when moving from M29W128G to 28F256M29EW.

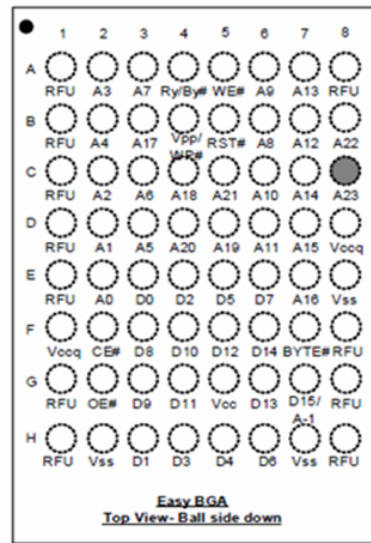


M29W128GH
M29W128GL



BGA connections (top view through package)

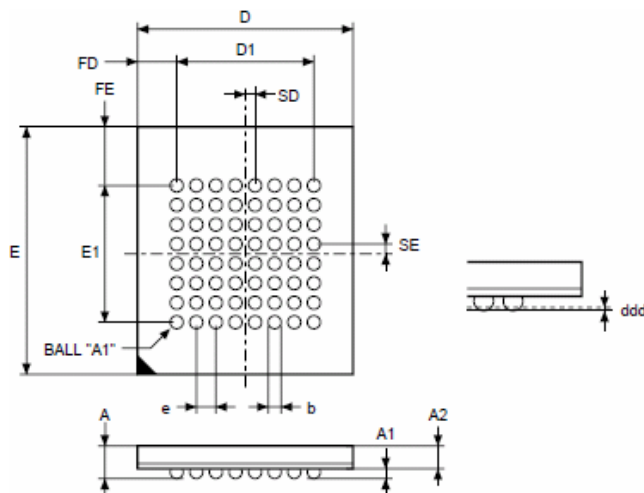
28F256M29EWH
28F256M29EVL



BGA connections (top view through package)

2.1.2 BGA Package Mechanical Difference

The 28F256M29EW device uses the Fortified BGA package while the M29W128G device uses the TBGA package. There are three major different physical dimensions – A1, D and b shown in the table below – which might require design consideration and programmers' hardware change during conversion from M29W128G to 28F256M29EW.



Symbol	28F256M29EW			M29W128G			Unit
	Min	Typ	Max	Min	Typ	Max	
A	-	-	1.40	-	-	1.20	mm
A1	0.40	0.49	-	0.20	0.30	0.35	
A2	-	0.80	-	-	0.80	-	
b	0.50	0.55	-	0.35	0.42	0.50	
D	10.90	11.00	11.10	9.90	10.00	10.10	
D1	-	7.00	-	-	7.00	-	
ddd	-	-	0.15	-	-	0.10	
e	-	1.00	-	-	1.00	-	
E	12.90	13.00	13.10	12.90	13.00	13.10	
E1	-	7.00	-	-	7.00	-	
FD	-	2.00	-	-	1.50	-	
FE	-	3.00	-	-	3.00	-	
SD	-	0.50	-	-	0.50	-	
SE	-	0.50	-	-	0.50	-	

2.1.3 12V V_{HH} Application

The 28F256M29EW device does not tolerate 12V V_{HH} on A9 pin to enter Autoselect mode, while normal command sequence can enter Autoselect mode. Application of 12V on A9 pin will damage the device.

The M29W128G device tolerates 12V V_{HH} on A9 to enter Autoselect mode as well as normal Autoselect entry command sequence.

2.1.4 I_{CCS} Difference

A comparison of I_{CCS} value difference between 28F256M29EW device and M29W128G device is shown in the following table. Comprehensive consideration of overall system power consumption is recommended.

Symbol	28F256M29EW		M29W128G		Unit
	Typ	Max	Typ	Max	
I _{CCS}	65	210	-	100	μA

2.2 Performance Differences

2.2.1 Random Access Time difference

The random access time of 28F256M29EW device is longer than that of M29W128G device. Read cycle must be long enough to comply with the random access time spec of 28F256M29EW during conversion from M29W128G device to 28F256M29EW device.

Description	28F256M29EW	M29W128G
Random Access Time	1.8V V _{CCQ} : 100nS	1.8V V _{CCQ} : 80nS
	3.0V V _{CCQ} : 100nS	3.0V V _{CCQ} : 70nS

2.2.2 Read / Write Buffer Size

The 28F256M29EW has larger read and program buffers than the M29W128G device. Modifying the software accordingly will improve read and program performance significantly.

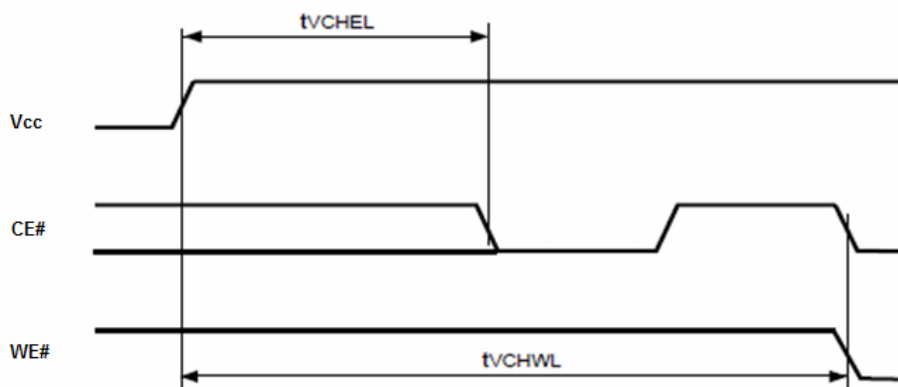
Description	28F256M29EW	M29W128G
Page Read Size	16Words (x16) 32Bytes (x8)	8Words (x16) 16Bytes (x8)
Program Buffer Size	512Words (x16) 256Bytes (x8)	32Words (x16) 64Bytes (x8)

2.2.3 Power-on Timing Sequence

The 28F256M29EW has a different power-on timing spec vs. the M29W128G device.

Parameter	Description	28F256M29EW	M29W128G
$t_{V_{CHEL}}$	V_{CC} High to Chip Enable Low	300 μ S	55 μ S
$t_{V_{CHWL}}$	V_{CC} High to Write Enable Low	300 μ S	500 μ S

The system must comply with the timing spec value ($t_{V_{CHEL}}$ or $t_{V_{CHWL}}$) before issuing any read or write command after power-on. Please refer to the waveform below.



2.3 Software Considerations

The 28F256M29EW device, as well as M29W128G, complies with GL interface command set. By considering the difference in below sections, it is easy to substitute 28F256M29EW flash for M29W128G flash product.

2.3.1 Manufacturer ID and Device Code

The 28F256M29EW device has different Manufacturer ID and different Device Code, compared with M29W128G, therefore if software checks the Manufacturer ID or Device Code, it should be modified accordingly.

A comparison between 28F256M29EW device and M29W128G device is outlined in the following table.

Identification Information	28F256M29EW (x16 / x8)	M29W128G (x16 / x8)
Manufacturer ID	0089h / 89h	0020h / 20h
Device Code Cycle 1	227Eh / 7Eh	227Eh / 7Eh
Device Code Cycle 2	2222h / 22h	2221h / 21h
Device Code Cycle 3	2201h / 01h 2200h / 00h	2201h / 01h 2200h / 00h

2.3.2 CFI Read Difference in x8 Mode

In x8 mode, reading CFI data in odd address from 28F256M29EW device is different from reading CFI data in odd address from M29W128G device. Refer to table below for details.

Address (x8)	28F256M29EW Read-out	M29W128G Read-out	Description
20h	51h	51h	Query unique ASCII string 'QRY', "Q"
21h	51h	00h	Query unique ASCII string 'QRY', "Q"
22h	52h	52h	Query unique ASCII string 'QRY', "R"
23h	52h	00h	Query unique ASCII string 'QRY', "R"
24h	59h	59h	Query unique ASCII string 'QRY', "Y"
25h	59h	00h	Query unique ASCII string 'QRY', "Y"
26h	02h	02h	Primary algorithm command set and control interface ID code 16 bit ID code defining a specific algorithm
27h	02h	00h	Primary algorithm command set and control interface ID code 16 bit ID code defining a specific algorithm
28h	00h	00h	Primary algorithm command set and control interface ID code 16 bit ID code defining a specific algorithm
29h	00h	00h	Primary algorithm command set and control interface ID code 16 bit ID code defining a specific algorithm
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
9Eh	xxh	xxh	Top/bottom boot block flag
9Fh	xxh	00h	Top/bottom boot block flag
A0h	01h	01h	Program suspend, 00 = not supported, 01 = supported
A1h	01h	00h	Program suspend, 00 = not supported, 01 = supported

2.3.3 Enhanced Buffered Program Command

M29W128G has a special program command called Enhanced Buffered Program command (33h) which is not supported by 28F256M29EW device. The Enhanced Buffered Program command must be changed into Buffer Program command (25h) if 33h command is used in the software during the conversion from M29W128G device to 28F256M29EW device.

2.3.4 Password Access

Password Access is a security enhancement offered on the M29EW series device. This feature protects information stored in the main-array blocks by preventing content alteration or reads until a valid 64-bit password is received. Password Access may be combined with Non-Volatile and/or Volatile Protection to create a multi-tiered solution.

Please contact your Numonyx™ Sales representatives for further details concerning Password Access feature.

APPENDIX A Additional Information

Order Number	Document / Tool
320002	Numonyx™ M29EW 256-Mbit(x8 or x16, page, uniform block) 3V Supply Flash Memory Datasheet

Notes:

1. Contact your local Numonyx or distribution sales office to request Numonyx documentation..
2. Visit the Numonyx World Wide Web home page at <http://www.Numonyx.com> for further information, technical documentation and tools.