AN201311

Migrating to Cypress S29GL-P Flash Family from Numonyx 130 nm Embedded Flash Memory (J3)/ 130 nm StrataFlash® Embedded Memory (P30) Devices

This application note provides conversion guidelines to Cypress S29GL-P flash family devices from Numonyx Embedded Memory (J3) and Numonyx StrataFlash® Embedded Memory (P30) devices.

1 Introduction

This application note provides conversion guidelines to Cypress S29GL-P flash family devices from Numonyx Embedded Memory (J3) and Numonyx StrataFlash® Embedded Memory (P30) devices.

This application note is based on information available to date from data sheets and other application notes publicly available from both Cypress and Numonyx. There may be specification updates that are not incorporated in this document. Please verify all relevant specifications (i.e. Data Sheets and Specification Bulletins) before finalizing any designs.

2 Feature Comparison

Cypress flash family devices are 3.0 V single power (V_{CC} = 2.7-3.6V) flash memory manufactured using 90 nm MirrorBit® technology. The S29GL-P product family includes densities from 128 Mb to 1 Gb.

Key attributes of Cypress S29GL-P products are

- Ease-of-Use: Seamless package and pinout transition between densities.
- High Performance: Fast Read, Program and Erase times.
- Advanced Sector Protection: Robust security feature allows for complete and total control of security levels for each and every sector.
- Enhanced Versatile I/O™: Wide I/O voltage range from 1.65V to 3.6V to support various applications.

Table 1. Feature Comparisons between Cypress S29GL-P Flash Family and Numonyx Embedded Flash Memory (J3 - 130 nm) (Sheet 1 of 2)

Feature		Product Specification			
		Cypress S29GL-P Flash Family		Numonyx Embedded Flash Memory (J3 - 130 nm)	
Density		128 Mb, 256 Mb, 512 Mb, 1 Gb (For 32 Mb and 64 Mb, please refer to Cypress S29GL-N data sheet)		32 Mb, 64 Mb, 128 Mb, 256 Mb	
Package (Pinout Style)		56-Pin TSOP	(Cypress, 128 Mb to 1 Gb)	56-lead TSOP	(J3, 32 Mb to 256 Mb)
		64-ball Fortified BGA	(Cypress, 128 Mb to 1 Gb) 11 x 13 x 1.4 mm	64-ball Easy BGA	(J3, 32 Mb to 256 Mb) 10 x 13 x 1.2 mm
Operating Voltage Range	V_{CC} (Core)	3.0 - 3.6V, 2.7 - 3.6V		2.7 - 3.6V	
	V_{IO} (I/O)	1.65 - 3.6V		2.7 - 3.6	
Data Bus		x8/x16		x8/x16	
Sector Architecture		Uniform 128-KByte		Uniform 128-KByte	

Table 1. Feature Comparisons between Cypress S29GL-P Flash Family and Numonyx Embedded Flash Memory (J3 - 130 nm) (Sheet 2 of 2)

Feature		Product Specification	
		Cypress S29GL-P Flash Family	Numonyx Embedded Flash Memory (J3 - 130 nm)
Read	Asynchronous Initial Access	128 Mb: 90/100/110 ns 256 Mb: 90/100/110 ns 512 Mb: 100/110/120 ns 1 Gb: 110/120/130 ns	32-128 Mb: 75 ns 256 Mb: 95 ns
	Asynchronous Page Access	25 ns (8 word)	25 ns (4/8 word)
	Synchronous	NA	NA
Program		15 µs (32-Word Write Buffer - Per Word) 60 µs (Single Word)	8 µs (16-Word Write Buffer - Per Word) 40 µs (Single Word)
Erase		0.5 sec per sector	1.0 sec per sector
Temperature Range		0°C to +70°C, –40°C to +85°C	–40°C to +85°C

Table 2. Feature Comparisons between Cypress S29GL-P Flash Family and Numonyx StrataFlash Embedded Memory (P30 - 130 nm)

Feature		Product Specification			
		Cypress S29GL-P Flash Family		Numonyx StrataFlash Embedded Memory (P30 - 130 nm)	
Density		128 Mb, 256 Mb, 512 Mb, 1 Gb (For 64 Mb, please refer to Cypress S29GL-N data sheet)		64 Mb, 128 Mb, 256 Mb 512 Mb (2 x 256 Mb Die)	
Package (Pinout Style)		56-Pin TSOP	(Cypress, 128 Mb to 1 Gb)	56-lead TSOP	(P30, 64 Mb to 512 Mb)
		64-ball Fortified BGA	(Cypress, 128 Mb to 1 Gb) 11 x 13 x 1.4 mm	64-ball Easy BGA	10 x 13 x 1.2 mm (P30, 64 Mb to 256 Mb) 10 x 13 x 1.3 mm (P30, 512 Mb)
		NA		Quad+ SCSP	(P30, 512 Mb) 8 x 11 x 1.2mm (P30, 256 Mb) 8 x 11 x 1.0mm (P30, 64 Mb, 128 Mb) 8 x 10 x 1.2mm
Operating Voltage Range	V_{CC} (Core)	3.0 - 3.6V, 2.7 - 3.6V		1.7 - 2.0V	
	V_{IO} (I/O)	1.65 - 3.6V		1.7 - 3.6V	
Data Bus		x8/x16		x16	
Sector Architecture		Uniform 128-KByte		128-Kbyte (Main Blocks) 4 x 32-Kbyte (Parameter Blocks)	
Read	Asynchronous Initial Access	128 Mb: 90/100/110 ns 256 Mb: 90/100/110 ns 512 Mb: 100/110/120 ns 1 Gb: 110/120/130 ns		64–128 Mb: 85 ns 256-512 Mb: 88/95 ns	
	Asynchronous Page Access	25 ns (8 word)		25 ns (4/8 word)	
	Synchronous	NA		40 MHz	
Program		15 µs (32-Word Write Buffer - Per Word) 60 µs (Single Word)		13.8 µs (32-Word Write Buffer - Per Word) 90 µs (Single Word)	
Erase		0.5 sec per sector		1.2 sec per sector	
Temperature Range		0°C to +70°C, –40°C to +85°C		–40°C to +85°C	

3 Security Feature

Cypress S29GL-P Flash Family devices feature Advanced Sector Protection, which allows robust and complete user-defined security level. Cypress Advanced Sector Protection replaces less secure hardware lock-hard methods; and removes the possibility of hardware hacking, where secure data may be compromised with the application of either high or low voltage on certain flash pins.

Cypress Advanced Sector Protection also includes a unique Password Protection method, allowing an even higher level of security. The Password Protection Method is a highly sophisticated protection method that requires a 64-bit, user-defined password before any sectors can be unlocked.

Table 3. Security Comparisons between Cypress S29GL-P Flash Family and Numonyx Embedded Flash Memory (J3) and Numonyx StrataFlash Embedded Memory (P30)

Security Features	Cypress S29GL-P Flash Memory	Numonyx Embedded Flash Memory (J3)	Numonyx StrataFlash Embedded Memory (P30)
Software Locking and Unlocking of Individual Sectors	Cypress Advanced Sector Protection: Locking individual sector is allowed Unlocking individual sector is allowed Password Protection (optional feature) further increases sector protection	Locking individual block is allowed via software Unlocking individual block is not allowed. All locked blocks must be unlocked in parallel.	Locking individual block is allowed Unlocking individual block is not allowed. All locked blocks must be unlocked in parallel.
Hardware Protection	WP# locks highest or lowest sector (Cypress offers Advanced Sector Protection for even greater security)	VPEN = GND	WP# hardware locks any Locked-Down Blocks VPP = GND
OTP Space	128 Word Secure Silicon Region (Factory lock or customer lock option)	128 bit Protection Register (64 bit User Programmable) (64 bit Unique Device Identifier)	17 x 128 bit OTP Registers (64 bits programmed at Numonyx factory)
Additional Options	Password Protection	NA	4 optional OTP blocks in the main array

4 Package and Pinout

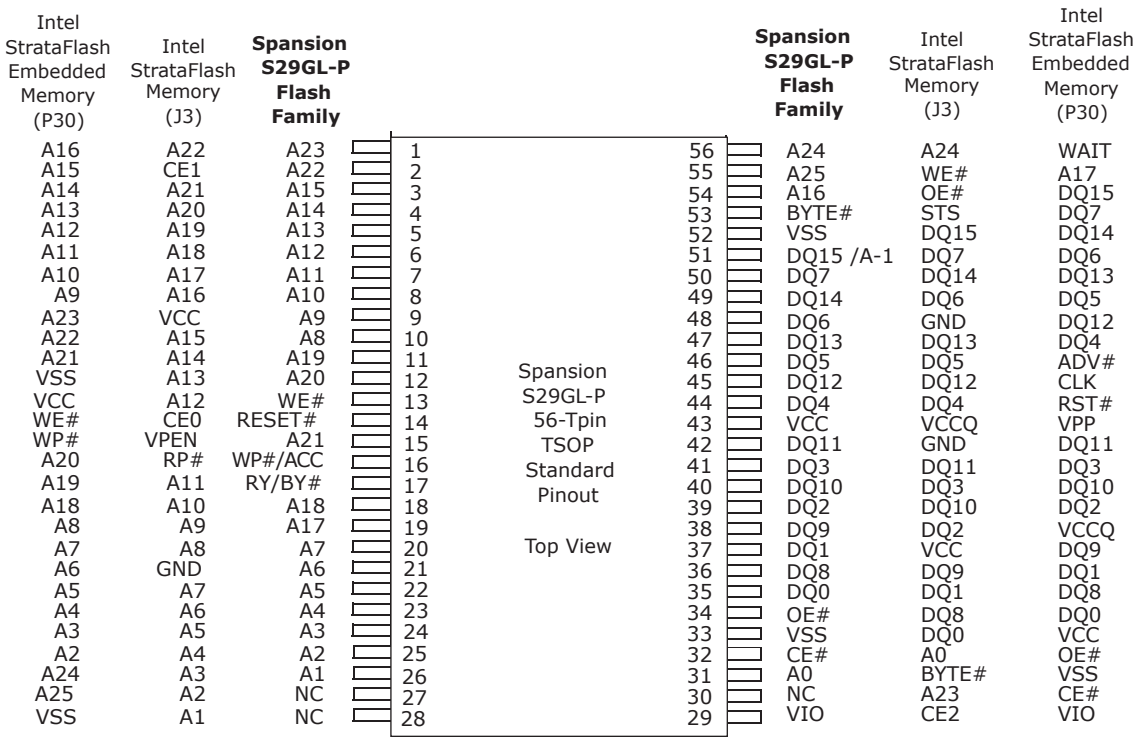
Cypress S29GL-P Flash Family devices allow flexibility between densities with seamless package and pinout offerings. Cypress S29GL-P is also pinout and package compatible to other Cypress flash families, such as the S29AL016J and S29GL-N. Contact your local Cypress representative or respective data sheets for further details.

By comparison, Numonyx devices vary package types and sizes as well as pinouts depending on density.

4.1 56 Pin TSOP Pinout Comparison

The 56-pin TSOP pinouts of Cypress and Numonyx are different. Migration from Numonyx products in 56-pin TSOP to the Cypress S29GL-P will require a board-level change.

Figure 1. 56 Pin TSOP Pinout Comparisons between Cypress S29GL-P Flash Family and Numonyx Embedded Flash Memory (J3) and Numonyx StrataFlash Embedded Memory (P30)



Notes for the S29GL-P:

1. *Pin 1 is NC on the S29GL128P.*
2. *Pin 56 is NC on the S29GL256P, and S29GL128P.*
3. *Pin 55 is NC on the S29GL512P, S29GL256P, and S29GL128P.*

4.2 BGA Pinout Comparisons

Cypress offers Cypress pinout Fortified BGA which allows backwards and forward compatibility within the S29GL-P family as well as other Cypress flash families.

Easy BGA pinouts are different from Cypress's Fortified BGA packages. Migration from Easy BGA products to the Cypress S29GL-P will require a board-level change.

4.3 Cypress 64-ball Fortified BGA Pinout vs. J3 Easy BGA Pinout

Figure 2. Cypress S29GL-P Fortified BGA

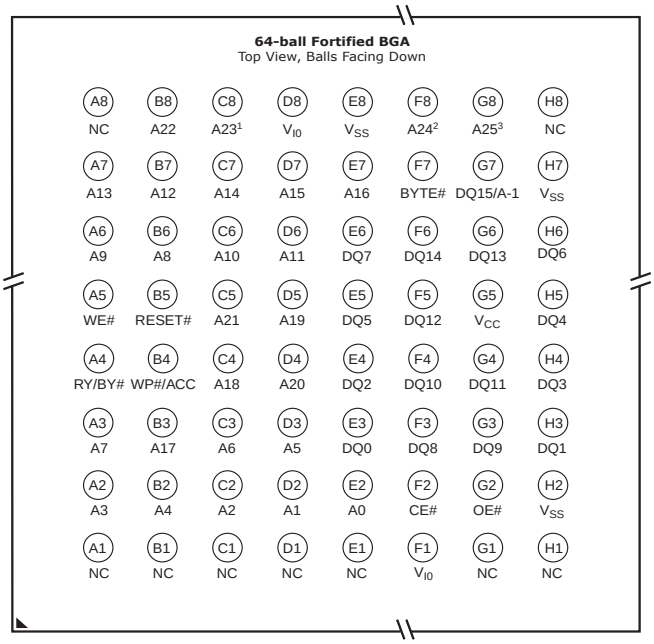
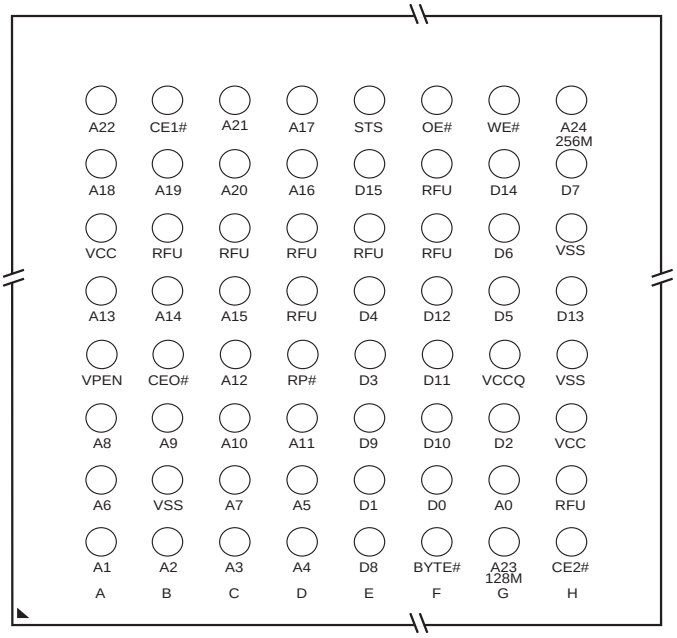


Figure 2. Numonyx Embedded Flash Memory (J3 - 130 nm) Easy BGA



Notes:

1. *NC on S29GL128P.*
2. *NC on S29GL128P and S29GL256P.*
3. *NC on S29GL128P, S29GL256P and S29GL512P.*

Table 4. Work-around to Convert from Numonyx Embedded Flash Memory (J3 - 130 nm) to Cypress S29GL-P

Cypress	Numonyx	Numonyx J3 Description	Work-Around
WP#/ACC	VPEN	V_{IH} enables erasing, programming or configuring lock-bits. With V_{IL}, memory contents cannot be altered.	Set the PPB Lock Bit. (Global Volatile Sector Protection Freeze Command)
CE#	CE0#	Chip enable activates the device.	N/A
N/A	CE1#	Chip enable activates the device. Selects multiple devices—can be tied to ground for single Flash.	N/A for single Flash device. PCB change required to support multiple Cypress Flash.
N/A	CE#2	Chip enable activates the device. Selects multiple devices—can be tied to ground for single Flash.	N/A for single Flash device. PCB change required to support multiple Cypress Flash.
RESET#	RP#	Reset/Power-Down Pin. V_{IL} resets and places the device in power-down mode. V_{IH} enables normal operation.	N/A
RY/BY#	STS	Provides the status of the device. In default mode, acts as RY/BY# signal. Can be configured to generate an interrupt when a program/erase operation is complete.	N/A if used as RY/BY#. No work-around available for interrupt.
DQ15/A-1	A0	Byte-Select Address is the lowest order bit in x8 mode. Not used in x16 mode.	
V_{IO}	VCCQ	I/O Power Supply supports 2.7 V-3.6V (tied to V_{CC}).	N/A: For Cypress model numbers 01 and 02.

4.4 Cypress 64-ball Fortified BGA Pinout vs. P30 Easy BGA Pinout

Figure 3. Cypress S29GL-P Fortified BGA

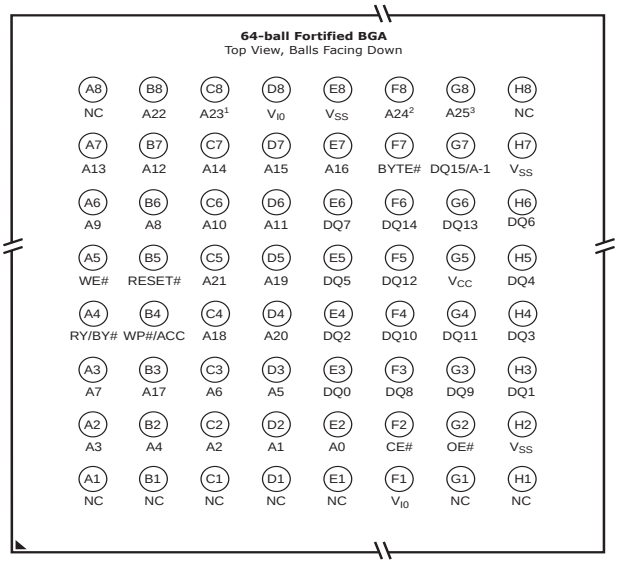
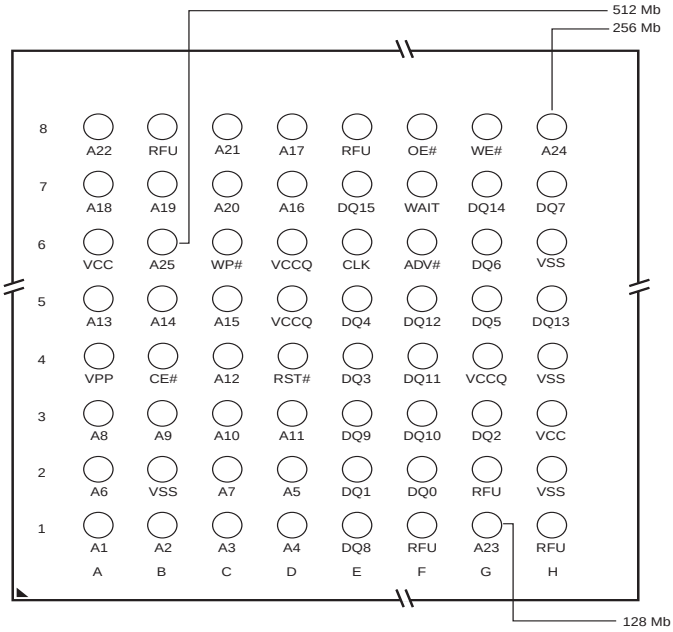


Figure 3. Numonyx StrataFlash Embedded Memory (P30 - 130 nm) Easy BGA



Notes:

1. *NC on S29GL128P.*
2. *NC on S29GL128P and S29GL256P.*
3. *NC on S29GL128P, S29GL256P and S29GL512P.*

Table 5. Work-around to Convert from Numonyx StrataFlash Embedded Memory (P30 - 130 nm) to Cypress S29GL-P

Cypress	Numonyx	Numonyx P30 Description	Work-Around
WP#/ACC	VPP	V_{PP} = GND memory contents cannot be altered.	Set the PPB Lock Bit. (Global Volatile Sector Protection Freeze Command)
WP#/ACC	WP#	Hardware locks any Locked-Down Blocks	Cypress At V_{IL}, disables program and erase functions in the outermost sectors. Use Advance Sector Protection to lock and unlock any sectors
RESET#	RST#	Reset: V_{IL} resets and places the device. V_{IH} enables normal operation	N/A
V_{IO}	VCCQ	Output Power Supply	If I/O's need to be <V_{CC}, use Cypress model numbers V1 and V2.
N/A	CLK	Clock to synchronous operations	N/A
RY/BY#	N/A	Function not supported.	N/A
N/A	ADV#	I/O Power Supply supports 2.7V-3.6V (tied to V_{CC}).	N/A
N/A	WAIT	Address Valid: Address are latched on the rising edge of ADV# for synchronous operations	N/A
N/A	BYTE#	N/A	Drive BYTE# to V_{IH}

5 Cypress Software Support

The J3 and P30 command sets are proprietary and will require SW redesign to an industry standard Flash command set.

Cypress is dedicated to providing customers with world-class technical service and support. To assist development of Cypress Flash memory, Cypress offers a full range of software and support tools which simplifies design and shorten time to market.

Cypress royalty free software tools include:

- Low Level Drivers (LLD)

- Enhanced Flash Driver (EFD)
- Data Management Software (DMS)
- Cypress File System (SSP)

For more information, ask your Cypress representative or visit the Cypress web site at http://www.Cypress.com/support/.

Technical software support is available by e-mail to software@spansion.com.

Document History Page

Document Title: AN201311 - Migrating to Cypress S29GL-P Flash Family from Numonyx 130 nm Embedded Flash Memory (J3)/ 130 nm StrataFlash® Embedded Memory (P30) Devices

Document Number: 002-01311

Rev.	ECN No.	Orig. of Change	Submission Date	Description of Change
**	–	–	07/01/2010	Initial version
*A	5005516	MSWI	11/06/2015	Updated in Cypress template
*B	5841942	AESATMP8	08/02/2017	Updated logo and Copyright.
*C	6234530	PRIT	07/09/2018	Updated template

Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturer's representatives, and distributors. To find the office closest to you, visit us at Cypress Locations.

Products

Arm® Cortex® Microcontrollers	cypress.com/arm
Automotive	cypress.com/automotive
Clocks & Buffers	cypress.com/clocks
Interface	cypress.com/interface
Internet of Things	cypress.com/iot
Memory	cypress.com/memory
Microcontrollers	cypress.com/mcu
PSoC	cypress.com/psoc
Power Management ICs	cypress.com/pmic
Touch Sensing	cypress.com/touch
USB Controllers	cypress.com/usb
Wireless Connectivity	cypress.com/wireless

PSoC® Solutions

PSoC 1 | PSoC 3 | PSoC 4 | PSoC 5LP | PSoC 6 MCU

Cypress Developer Community

Community | Projects | Video | Blogs | Training | Components

Technical Support

cypress.com/support

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709