

S29GL-N MirrorBit™ Flash Family

S29GL512N, S29GL256N, S29GL128N
512 Megabit, 256 Megabit, and 128 Megabit,
3.0 Volt-only Page Mode Flash Memory featuring
110 nm MirrorBit™ Process Technology



Data Sheet

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Data Sheet

Distinctive Characteristics

Architectural Advantages

- **Single power supply operation**
 - 3 volt read, erase, and program operations
- **Enhanced Versatile I/O™ control**
 - All input levels (address, control, and DQ input levels) and outputs are determined by voltage on V_{IO} input. V_{IO} range is 1.65 to V_{CC}
- **Manufactured on 110 nm MirrorBit process technology**
- **Secured Silicon Sector region**
 - 128-word/256-byte sector for permanent, secure identification through an 8-word/16-byte random Electronic Serial Number, accessible through a command sequence
 - May be programmed and locked at the factory or by the customer
- **Flexible sector architecture**
 - S29GL512N: Five hundred twelve 64 Kword (128 Kbyte) sectors
 - S29GL256N: Two hundred fifty-six 64 Kword (128 Kbyte) sectors
 - S29GL128N: One hundred twenty-eight 64 Kword (128 Kbyte) sectors
- **Compatibility with JEDEC standards**
 - Provides pinout and software compatibility for single-power supply flash, and superior inadvertent write protection
- **100,000 erase cycles per sector typical**
- **20-year data retention typical**

Performance Characteristics

- **High performance**
 - 90 ns access time (S29GL128N, S29GL256N)
 - 100 ns (S29GL512N)
 - 8-word/16-byte page read buffer
 - 25 ns page read times
 - 16-word/32-byte write buffer reduces overall programming time for multiple-word updates
- **Low power consumption (typical values at 3.0 V, 5 MHz)**
 - 25 mA typical active read current;
 - 50 mA typical erase/program current
 - 1 µA typical standby mode current

Package options

- 56-pin TSOP
- 64-ball Fortified BGA

Software & Hardware Features

Software features

- Program Suspend and Resume: read other sectors before programming operation is completed
- Erase Suspend and Resume: read/program other sectors before an erase operation is completed
- Data# polling and toggle bits provide status
- Unlock Bypass Program command reduces overall multiple-word programming time
- CFI (Common Flash Interface) compliant: allows host system to identify and accommodate multiple flash devices

Hardware features

- Advanced Sector Protection
- WP#/ACC input accelerates programming time (when high voltage is applied) for greater throughput during system production. Protects first or last sector regardless of sector protection settings
- Hardware reset input (RESET#) resets device
- Ready/Busy# output (RY/BY#) detects program or erase cycle completion

Product Availability Table

| Density | Init. Access | V _{CC} | Availability |
|---------|--------------|-----------------|--------------|
| 512 Mb | 110 ns | Full | Now |
| | 100 ns | Full | Now |
| 256 Mb | 110 ns | Full | Now |
| | 100 ns | Full | Now |
| | 90 ns | Regulated | Now |
| 128 Mb | 110 ns | Full | Now |
| | 100 ns | Full | Now |
| | 90 ns | Regulated | Now |

General Description

The S29GL512/256/128N family of devices are 3.0V single power flash memory manufactured using 110 nm MirrorBit technology. The S29GL512N is a 512 Mbit, organized as 33,554,432 words or 67,108,864 bytes. The S29GL256N is a 256 Mbit, organized as 16,777,216 words or 33,554,432 bytes. The S29GL128N is a 128 Mbit, organized as 8,388,608 words or 16,777,216 bytes. The devices have a 16-bit wide data bus that can also function as an 8-bit wide data bus by using the BYTE# input. The device can be programmed either in the host system or in standard EPROM programmers.

Access times as fast as 90 ns (S29GL128N, S29GL256N), 100 ns (S29GL512N) are available. Note that each access time has a specific operating voltage range (V_{CC}) and an I/O voltage range (V_{IO}), as specified in the [Product Selector Guide, on page 6](#) and the [Ordering Information, on page 12](#). The devices are offered in a 56-pin TSOP or 64-ball Fortified BGA package. Each device has separate chip enable (CE#), write enable (WE#) and output enable (OE#) controls.

Each device requires only a **single 3.0 volt power supply** for both read and write functions. In addition to a V_{CC} input, a high-voltage **accelerated program (WP#/ACC)** input provides shorter programming times through increased current. This feature is intended to facilitate factory throughput during system production, but may also be used in the field if desired.

The devices are entirely command set compatible with the **JEDEC single-power-supply Flash standard**. Commands are written to the device using standard microprocessor write timing. Write cycles also internally latch addresses and data needed for the programming and erase operations.

The **sector erase architecture** allows memory sectors to be erased and reprogrammed without affecting the data contents of other sectors. The device is fully erased when shipped from the factory.

Device programming and erasure are initiated through command sequences. Once a program or erase operation has begun, the host system need only poll the DQ7 (Data# Polling) or DQ6 (toggle) **status bits** or monitor the **Ready/Busy# (RY/BY#)** output to determine whether the operation is complete. To facilitate programming, an **Unlock Bypass** mode reduces command sequence overhead by requiring only two write cycles to program data instead of four.

The **Enhanced Versatile I/O™** (V_{IO}) control allows the host system to set the voltage levels that the device generates and tolerates on all input levels (address, chip control, and DQ input levels) to the same voltage level that is asserted on the V_{IO} pin. This allows the device to operate in a 1.8 V or 3 V system environment as required.

Hardware data protection measures include a low V_{CC} detector that automatically inhibits write operations during power transitions. **Persistent Sector Protection** provides in-system, command-enabled protection of any combination of sectors using a single power supply at V_{CC} . **Password Sector Protection** prevents unauthorized write and erase operations in any combination of sectors through a user-defined 64-bit password.

The **Erase Suspend/Erase Resume** feature allows the host system to pause an erase operation in a given sector to read or program any other sector and then complete the erase operation. The **Program Suspend/Program Resume** feature enables the host system to pause a program operation in a given sector to read any other sector and then complete the program operation.

The **hardware RESET# pin** terminates any operation in progress and resets the device, after which it is then ready for a new operation. The RESET# pin may be tied to the system reset circuitry. A system reset would thus also reset the device, enabling the host system to read boot-up firmware from the Flash memory device.

The device reduces power consumption in the **standby mode** when it detects specific voltage levels on CE# and RESET#, or when addresses have been stable for a specified period of time.

The **Secured Silicon Sector** provides a 128-word/256-byte area for code or data that can be permanently protected. Once this sector is protected, no further changes within the sector can occur.

The **Write Protect (WP#/ACC)** feature protects the first or last sector by asserting a logic low on the WP# pin.

MirrorBit flash technology combines years of Flash memory manufacturing experience to produce the highest levels of quality, reliability and cost effectiveness. The device electrically erases all bits within a sector simultaneously via hot-hole assisted erase. The data is programmed using hot electron injection.

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Product Selector Guide

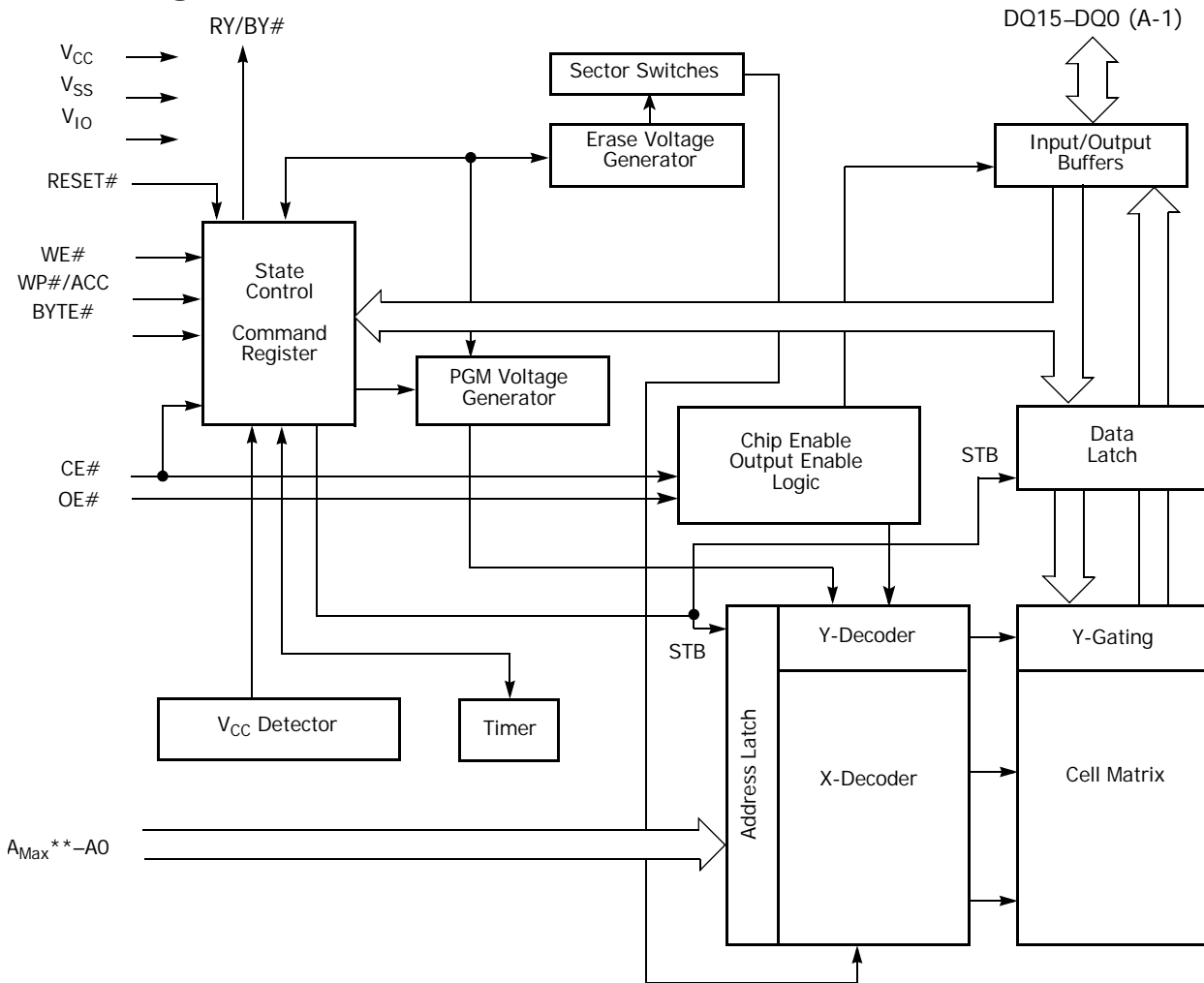
S29GL512N

| Part Number | S29GL512N | | | | |
|----------------------------|-----------------------------|------------------------------|-----|-----|-----|
| Speed Option | $V_{CC} = 2.7-3.6\text{ V}$ | $V_{IO} = 2.7-3.6\text{ V}$ | 10 | 11 | |
| | | $V_{IO} = 1.65-3.6\text{ V}$ | | | 11 |
| Max. Access Time (ns) | | | 100 | 110 | 110 |
| Max. CE# Access Time (ns) | | | 100 | 110 | 110 |
| Max. Page access time (ns) | | | 25 | 25 | 30 |
| Max. OE# Access Time (ns) | | | 25 | 35 | 35 |

S29GL256N, S29GL128N

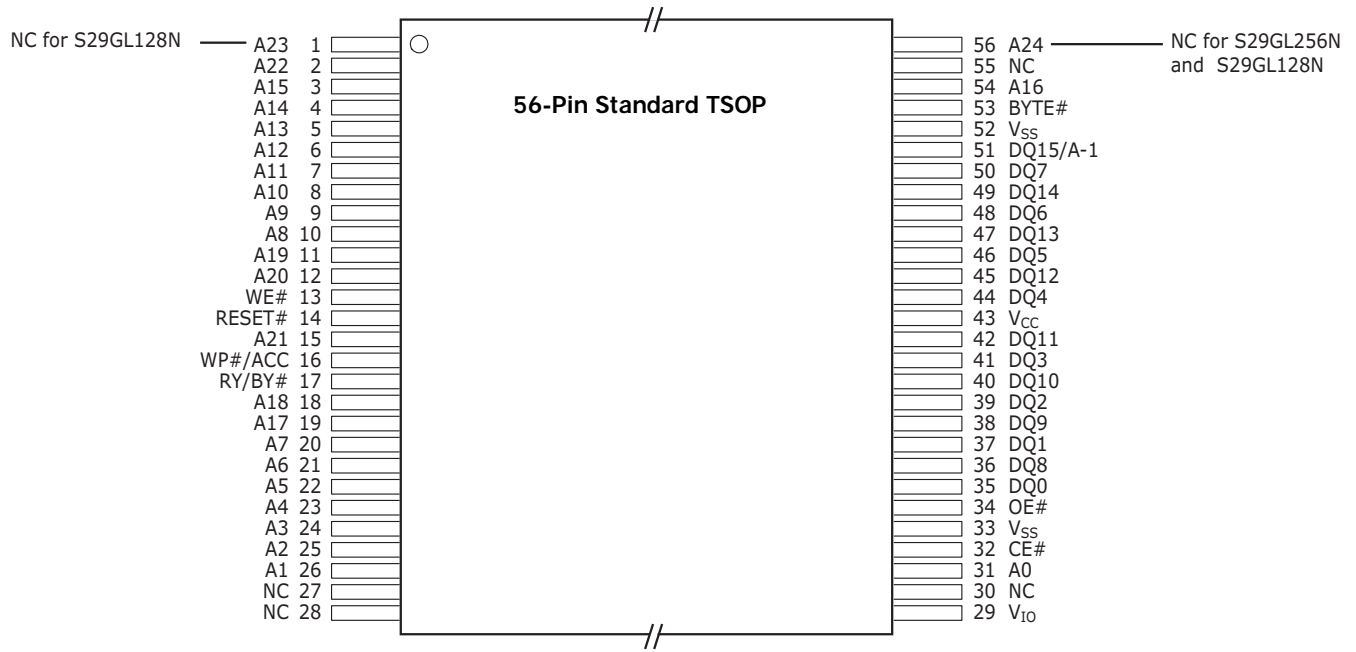
| Part Number | S29GL256N, S29GL128N | | | | |
|----------------------------|---|---|----|-----|-----|
| Speed Option | $V_{CC} = 2.7-3.6\text{ V}$ | $V_{IO} = 2.7-3.6\text{ V}$ | | 10 | 11 |
| | | $V_{IO} = 1.65-1.95\text{ V}$ | | | 11 |
| | $V_{CC} = \text{Regulated } (3.0-3.6\text{ V})$ | $V_{IO} = \text{Regulated } (3.0-3.6\text{ V})$ | 90 | | |
| Max. Access Time (ns) | | | 90 | 100 | 110 |
| Max. CE# Access Time (ns) | | | 90 | 100 | 110 |
| Max. Page access time (ns) | | | 25 | 25 | 30 |
| Max. OE# Access Time (ns) | | | 25 | 35 | 35 |

Block Diagram



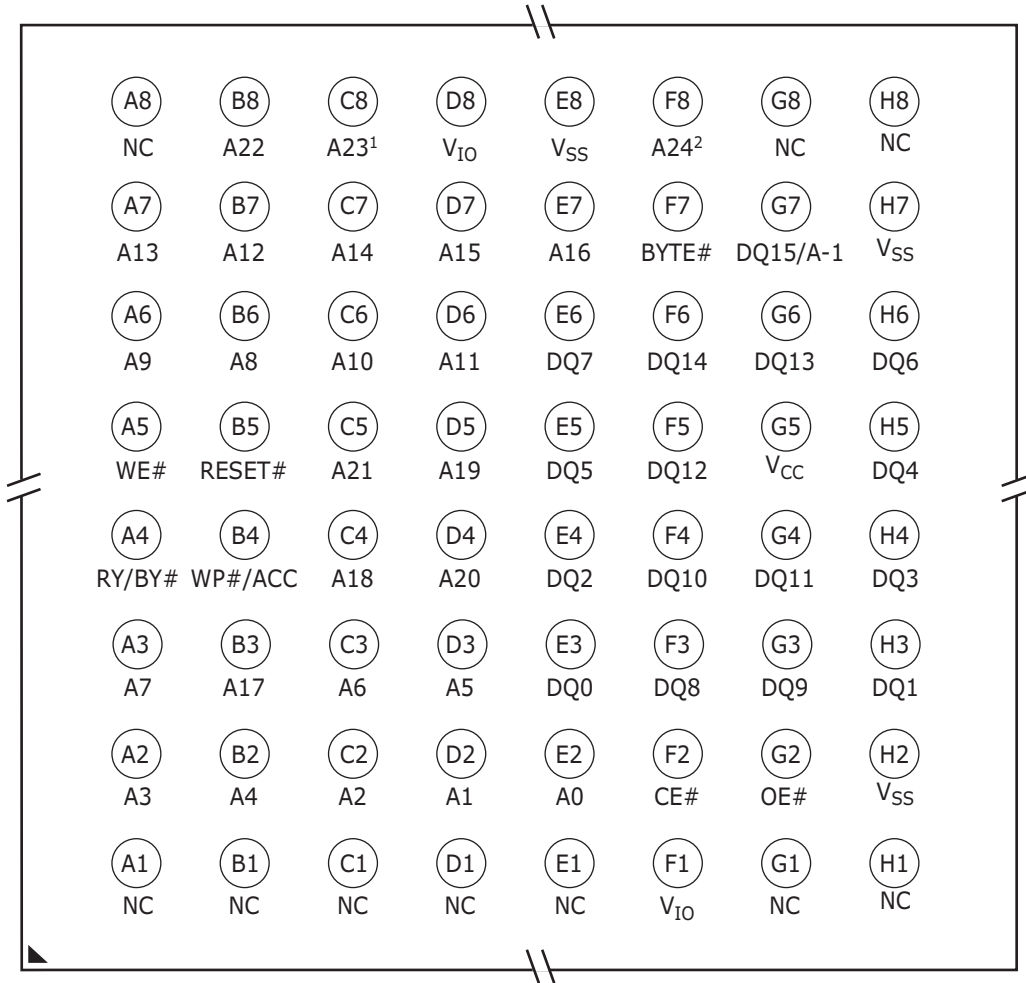
** A_{Max} GL512N = A24, A_{Max} GL256N = A23, A_{Max} GL128N = A22

Connection Diagrams



Connection Diagrams

64-ball Fortified BGA
Top View, Balls Facing Down



Notes:

1. Ball C8 is NC on S29GL128N
2. Ball F8 is NC on S29GL256N and S29GL128N

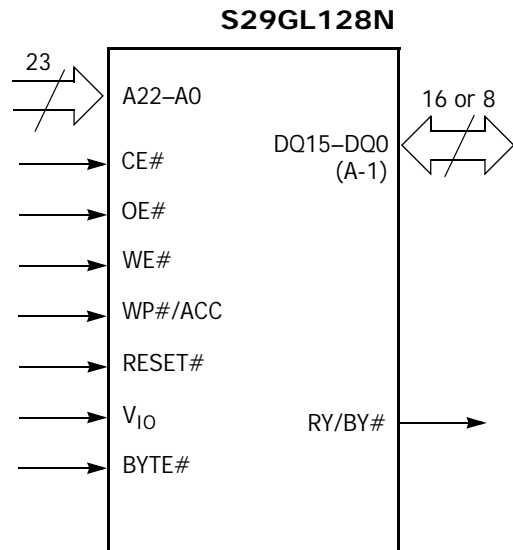
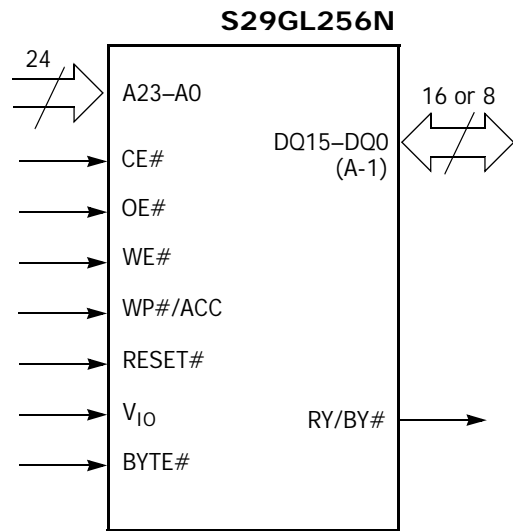
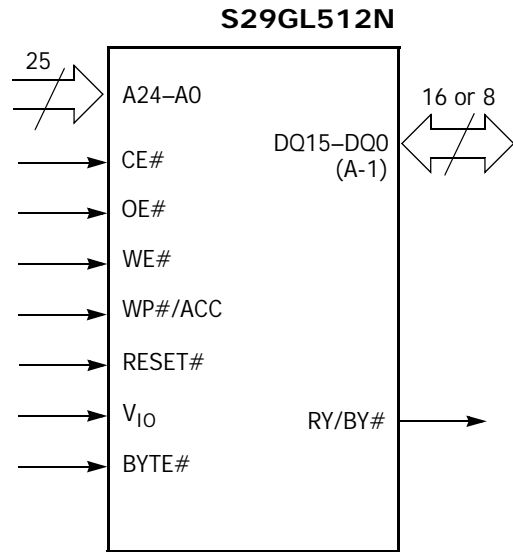
Special Package Handling Instructions

Special handling is required for Flash Memory products in molded packages (TSOP, BGA). The package and/or data integrity may be compromised if the package body is exposed to temperatures above 150°C for prolonged periods of time.

Pin Description

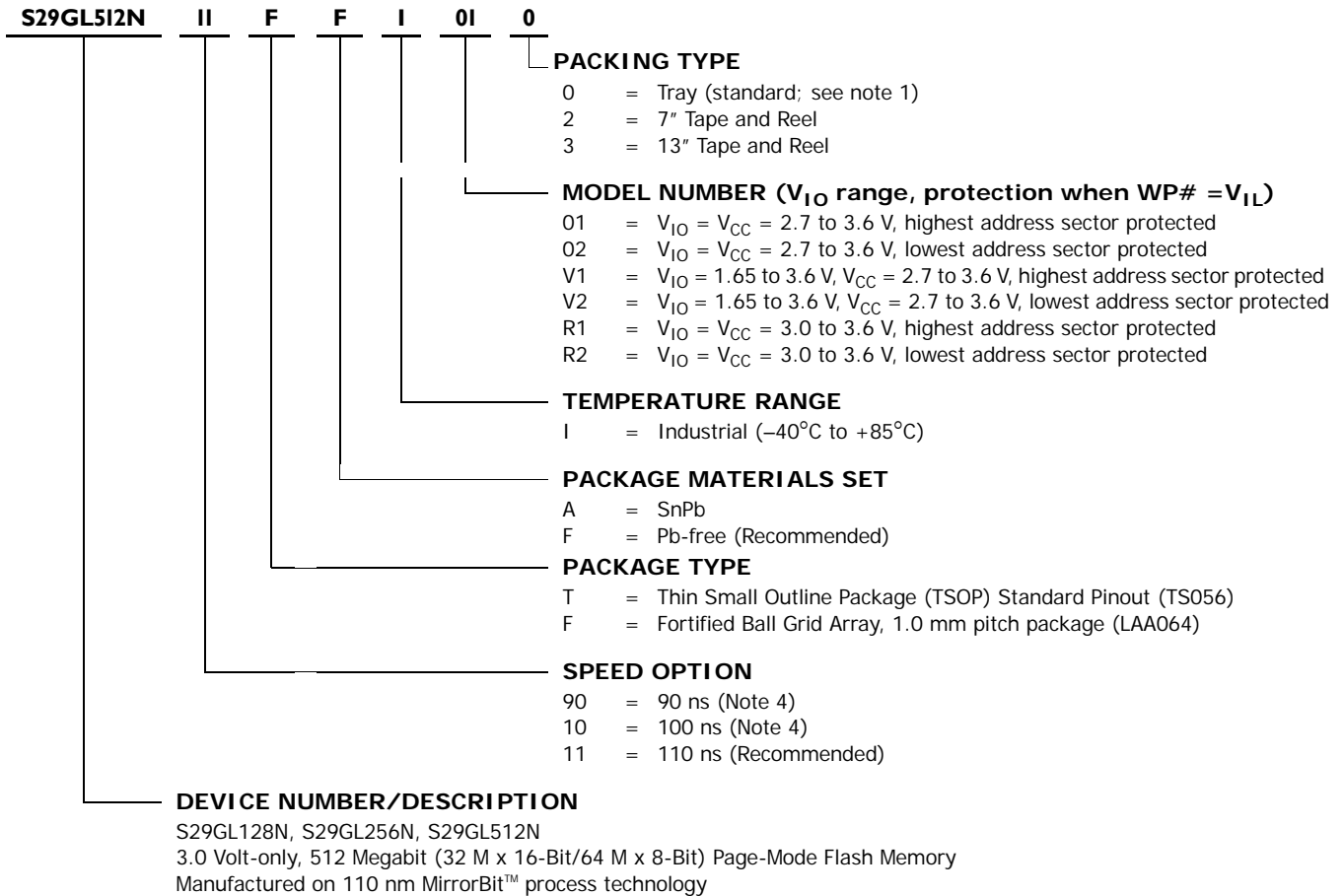
| | | |
|-----------------|---|---|
| A24–A0 | = | 25 Address inputs (512 Mb) |
| A23–A0 | = | 24 Address inputs (256 Mb) |
| A22–A0 | = | 23 Address inputs (128 Mb) |
| DQ14–DQ0 | = | 15 Data inputs/outputs |
| DQ15/A-1 | = | DQ15 (Data input/output, word mode), A-1 (LSB Address input, byte mode) |
| CE# | = | Chip Enable input |
| OE# | = | Output Enable input |
| WE# | = | Write Enable input |
| WP#/ACC | = | Hardware Write Protect input; Acceleration input |
| RESET# | = | Hardware Reset Pin input |
| BYTE# | = | Selects 8-bit or 16-bit mode |
| RY/BY# | = | Ready/Busy output |
| V _{CC} | = | 3.0 volt-only single power supply (see Product Selector Guide for speed options and voltage supply tolerances) |
| V _{IO} | = | Output Buffer power |
| V _{SS} | = | Device Ground |
| NC | = | Pin Not Connected Internally |

Logic Symbol



Ordering Information

The ordering part number is formed by a valid combination of the following:



Valid Combinations

Valid Combinations list configurations planned to be supported in volume for this device. Consult your local sales office to confirm availability of specific valid combinations and to check on newly released combinations.

| S29GL-N Valid Combinations | | | | | |
|----------------------------|------------|----------------------------------|-------------|--------------|------------------|
| Base Part Number | Speed (ns) | Package | Temperature | Model Number | Packing Type |
| S29GL128N | 90 | TA, TF (Note 2); FA, FF (Note 3) | I | R1, R2 | 0, 2, 3 (Note 1) |
| | 10, 11 | | | 01, 02 | |
| | 11 | | | V1, V2 | |
| S29GL256N | 90 | TA, TF (Note 2); FA, FF (Note 3) | I | R1, R2 | 0, 2, 3 (Note 1) |
| | 10, 11 | | | 01, 02 | |
| | 11 | | | V1, V2 | |
| S29GL512N | 10, 11 | TA, TF (Note 2); FA, FF (Note 3) | I | 01, 02 | 0, 2, 3 (Note 1) |
| | 11 | | | V1, V2 | |

Notes:

- Type 0 is standard. Specify other options as required. TSOP can be packed in Types 0 and 3; BGA can be packed in Types 0, 2, 3.
- TSOP package marking omits packing type designator from ordering part number.
- BGA package marking omits leading "S29" and packing type designator from ordering part number.
- Contact a local sales representative for availability.

Device Bus Operations

This section describes the requirements and use of the device bus operations, which are initiated through the internal command register. The command register itself does not occupy any addressable memory location. The register is a latch used to store the commands, along with the address and data information needed to execute the command. The contents of the register serve as inputs to the internal state machine. The state machine outputs dictate the function of the device. [Table 1](#) lists the device bus operations, the inputs and control levels they require, and the resulting output. The following subsections describe each of these operations in further detail.

Table 1. Device Bus Operations

| Operation | CE# | OE# | WE# | RESET# | WP#/ACC | Addresses (Note 1) | DQ0– DQ7 | DQ8–DQ15 | |
|-----------------------|----------------------------|-----|-----|----------------------------|-----------------|-----------------------|------------------|----------------------------|-------------------------------------|
| | | | | | | | | BYTE# = V _{IH} | BYTE# = V _{IL} |
| Read | L | L | H | H | X | A _{IN} | D _{OUT} | D _{OUT} | DQ8–DQ14 = High-Z, DQ15 = A-1 |
| Write (Program/Erase) | L | H | L | H | Note 2 | A _{IN} | (Note 3) | (Note 3) | |
| Accelerated Program | L | H | L | H | V _{HH} | A _{IN} | (Note 3) | (Note 3) | |
| Standby | V _{CC} ± 0.3 V | X | X | V _{CC} ± 0.3 V | H | X | High-Z | High-Z | High-Z |
| Output Disable | L | H | H | H | X | X | High-Z | High-Z | High-Z |
| Reset | X | X | X | L | X | X | High-Z | High-Z | High-Z |

Legend: L = Logic Low = V_{IL}, H = Logic High = V_{IH}, V_{ID} = 11.5–12.5 V, V_{HH} = 11.5–12.5V, X = Don't Care, SA = Sector Address, A_{IN} = Address In, D_{IN} = Data In, D_{OUT} = Data Out

Notes:

- Addresses are A_{Max}:A₀ in word mode; A_{Max}:A-1 in byte mode. Sector addresses are A_{Max}:A16 in both modes.
- If WP# = V_{IL}, the first or last sector group remains protected. If WP# = V_{IH}, the first or last sector is protected or unprotected as determined by the method described in "Write Protect (WP#)". All sectors are unprotected when shipped from the factory (The Secured Silicon Sector may be factory protected depending on version ordered.)
- D_{IN} or D_{OUT} as required by command sequence, data polling, or sector protect algorithm (see [Figure 2](#), [Figure 4](#), and [Figure 5](#)).

Word/Byte Configuration

The BYTE# pin controls whether the device data I/O pins operate in the byte or word configuration. If the BYTE# pin is set at logic '1', the device is in word configuration, DQ0–DQ15 are active and controlled by CE# and OE#.

If the BYTE# pin is set at logic '0', the device is in byte configuration, and only data I/O pins DQ0–DQ7 are active and controlled by CE# and OE#. The data I/O pins DQ8–DQ14 are tri-stated, and the DQ15 pin is used as an input for the LSB (A-1) address function.

VersatileIO™ (V_{IO}) Control

The VersatileIO™ (V_{IO}) control allows the host system to set the voltage levels that the device generates and tolerates on CE# and DQ I/Os to the same voltage level that is asserted on V_{IO}. See Ordering Information for V_{IO} options on this device.

For example, a V_{IO} of 1.65–3.6 volts allows for I/O at the 1.8 or 3 volt levels, driving and receiving signals to and from other 1.8 or 3 V devices on the same data bus.

Requirements for Reading Array Data

To read array data from the outputs, the system must drive the CE# and OE# pins to V_{IL} . CE# is the power control and selects the device. OE# is the output control and gates array data to the output pins. WE# should remain at V_{IH} .

The internal state machine is set for reading array data upon device power-up, or after a hardware reset. This ensures that no spurious alteration of the memory content occurs during the power transition. No command is necessary in this mode to obtain array data. Standard microprocessor read cycles that assert valid addresses on the device address inputs produce valid data on the device data outputs. The device remains enabled for read access until the command register contents are altered.

See [Reading Array Data, on page 50](#) for more information. Refer to the AC Read-Only Operations table for timing specifications and to [Figure 11, on page 78](#) for the timing diagram. Refer to the DC Characteristics table for the active current specification on reading array data.

Page Mode Read

The device is capable of fast page mode read and is compatible with the page mode Mask ROM read operation. This mode provides faster read access speed for random locations within a page. The page size of the device is 8 words/16 bytes. The appropriate page is selected by the higher address bits A(max)–A3. Address bits A2–A0 in word mode (A2–A-1 in byte mode) determine the specific word within a page. This is an asynchronous operation; the microprocessor supplies the specific word location.

The random or initial page access is equal to t_{ACC} or t_{CE} and subsequent page read accesses (as long as the locations specified by the microprocessor falls within that page) is equivalent to t_{PACC} . When CE# is de-asserted and reasserted for a subsequent access, the access time is t_{ACC} or t_{CE} . Fast page mode accesses are obtained by keeping the “read-page addresses” constant and changing the “intra-read page” addresses.

Writing Commands/Command Sequences

To write a command or command sequence (which includes programming data to the device and erasing sectors of memory), the system must drive WE# and CE# to V_{IL} , and OE# to V_{IH} .

The device features an **Unlock Bypass** mode to facilitate faster programming. Once the device enters the Unlock Bypass mode, only two write cycles are required to program a word or byte, instead of four. The “Word Program Command Sequence” section has details on programming data to the device using both standard and Unlock Bypass command sequences.

An erase operation can erase one sector, multiple sectors, or the entire device. [Table 2 on page 16](#), [Table 4 on page 34](#), and [Table 5 on page 37](#) indicate the address space that each sector occupies.

Refer to the DC Characteristics table for the active current specification for the write mode. The AC Characteristics section contains timing specification tables and timing diagrams for write operations.

Write Buffer

Write Buffer Programming allows the system write to a maximum of 16 words/32 bytes in one programming operation. This results in faster effective programming time than the standard programming algorithms. See [Write Buffer, on page 14](#) for more information.

Accelerated Program Operation

The device offers accelerated program operations through the ACC function. This is one of two functions provided by the WP#/ACC pin. This function is primarily intended to allow faster manufacturing throughput at the factory.

If the system asserts V_{HH} on this pin, the device automatically enters the aforementioned Unlock Bypass mode, temporarily unprotects any protected sector groups, and uses the higher voltage on the pin to reduce the time required for program operations. The system would use a two-cycle program command sequence as required by the Unlock Bypass mode. Removing V_{HH} from the WP#/ACC pin returns the device to normal operation. *Note that the WP#/ACC pin must not be at V_{HH} for operations other than accelerated programming, or device damage may result. WP# has an internal pullup; when unconnected, WP# is at V_{IH} .*

Autoselect Functions

If the system writes the autoselect command sequence, the device enters the autoselect mode. The system can then read autoselect codes from the internal register (which is separate from the memory array) on DQ7–DQ0. Standard read cycle timings apply in this mode. Refer to the [Autoselect Mode, on page 37](#) and [Autoselect Command Sequence, on page 51](#), for more information.

Standby Mode

When the system is not reading or writing to the device, it can place the device in the standby mode. In this mode, current consumption is greatly reduced, and the outputs are placed in the high impedance state, independent of the OE# input.

The device enters the CMOS standby mode when the CE# and RESET# pins are both held at $V_{IO} \pm 0.3$ V. (Note that this is a more restricted voltage range than V_{IH} .) If CE# and RESET# are held at V_{IH} , but not within $V_{IO} \pm 0.3$ V, the device is in the standby mode, but the standby current is greater. The device requires standard access time (t_{CE}) for read access when the device is in either of these standby modes, before it is ready to read data.

If the device is deselected during erasure or programming, the device draws active current until the operation is completed.

Refer to [DC Characteristics, on page 74](#) for the standby current specification.

Automatic Sleep Mode

The automatic sleep mode minimizes Flash device energy consumption. The device automatically enables this mode when addresses remain stable for $t_{ACC} + 30$ ns. The automatic sleep mode is independent of the CE#, WE#, and OE# control signals. Standard address access timings provide new data when addresses are changed. While in sleep mode, output data is latched and always available to the system. Refer to [DC Characteristics, on page 74](#) for the automatic sleep mode current specification.

RESET#: Hardware Reset Pin

The RESET# pin provides a hardware method of resetting the device to reading array data. When the RESET# pin is driven low for at least a period of t_{RP} , the device immediately terminates any operation in progress, tristates all output pins, and ignores all read/write commands for the duration of the RESET# pulse. The device also resets the internal state machine to reading array data. The operation that was interrupted should be reinitiated once the device is ready to accept another command sequence, to ensure data integrity.

Current is reduced for the duration of the RESET# pulse. When RESET# is held at $V_{SS} \pm 0.3$ V, the device draws CMOS standby current (I_{CC5}). If RESET# is held at V_{IL} but not within $V_{SS} \pm 0.3$ V, the standby current is greater.

The RESET# pin may be tied to the system reset circuitry. A system reset would thus also reset the Flash memory, enabling the system to read the boot-up firmware from the Flash memory.

Refer to the AC Characteristics tables for RESET# parameters and to [Figure 13, on page 79](#) for the timing diagram.

Output Disable Mode

When the OE# input is at V_{IH}, output from the device is disabled. The output pins are placed in the high impedance state.

Table 2. Sector Address Table–S29GL512N (Sheet 1 of 12)

| Sector | A24–A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| SA0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0000000–001FFFF | 0000000–000FFFF |
| SA1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0020000–003FFFF | 0010000–001FFFF |
| SA2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0040000–005FFFF | 0020000–002FFFF |
| SA3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0060000–007FFFF | 0030000–003FFFF |
| SA4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0080000–009FFFF | 0040000–004FFFF |
| SA5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 00A0000–00BFFFF | 0050000–005FFFF |
| SA6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 00C0000–00DFFFF | 0060000–006FFFF |
| SA7 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 00E0000–00FFFFFF | 0070000–007FFFF |
| SA8 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0100000–011FFFF | 0080000–008FFFF |
| SA9 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0120000–013FFFF | 0090000–009FFFF |
| SA10 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0140000–015FFFF | 00A0000–00AFFFF |
| SA11 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0160000–017FFFF | 00B0000–00BFFFF |
| SA12 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0180000–019FFFF | 00C0000–00CFFFF |
| SA13 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 01A0000–01BFFFF | 00D0000–00DFFFF |
| SA14 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 01C0000–01DFFFF | 00E0000–00EFFFF |
| SA15 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 01E0000–01FFFFFF | 00F0000–00FFFFFF |
| SA16 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0200000–021FFFF | 0100000–010FFFF |
| SA17 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0220000–023FFFF | 0110000–011FFFF |
| SA18 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0240000–025FFFF | 0120000–012FFFF |
| SA19 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0260000–027FFFF | 0130000–013FFFF |
| SA20 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0280000–029FFFF | 0140000–014FFFF |
| SA21 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 02A0000–02BFFFF | 0150000–015FFFF |
| SA22 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 02C0000–02DFFFF | 0160000–016FFFF |
| SA23 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 02E0000–02FFFFFF | 0170000–017FFFF |
| SA24 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0300000–031FFFF | 0180000–018FFFF |
| SA25 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0320000–033FFFF | 0190000–019FFFF |
| SA26 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0340000–035FFFF | 01A0000–01AFFFF |
| SA27 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0360000–037FFFF | 01B0000–01BFFFF |
| SA28 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0380000–039FFFF | 01C0000–01CFFFF |
| SA29 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 03A0000–03BFFFF | 01D0000–01DFFFF |
| SA30 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 03C0000–03DFFFF | 01E0000–01EFFFF |
| SA31 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 03E0000–0EFFFFFF | 01F0000–01FFFFFF |
| SA32 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0400000–041FFFF | 0200000–020FFFF |
| SA33 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0420000–043FFFF | 0210000–021FFFF |
| SA34 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0440000–045FFFF | 0220000–022FFFF |
| SA35 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0460000–047FFFF | 0230000–023FFFF |
| SA36 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0480000–049FFFF | 0240000–024FFFF |
| SA37 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 04A0000–04BFFFF | 0250000–025FFFF |
| SA38 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 04C0000–04DFFFF | 0260000–026FFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 2 of 12)

| Sector | A24–A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | | | |
| SA39 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 04E0000–04FFFFFF | 0270000–027FFFF |
| SA40 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0500000–051FFFF | 0280000–028FFFF |
| SA41 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0520000–053FFFF | 0290000–029FFFF |
| SA42 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0540000–055FFFF | 02A0000–02AFFFF |
| SA43 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0560000–057FFFF | 02B0000–02BFFFF |
| SA44 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0580000–059FFFF | 02C0000–02CFFFF |
| SA45 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 05A0000–05BFFFF | 02D0000–02DFFFF |
| SA46 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 05C0000–05DFFFF | 02E0000–02EFFFF |
| SA47 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 05E0000–05FFFFFF | 02F0000–02FFFFFF |
| SA48 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0600000–061FFFF | 0300000–030FFFF |
| SA49 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0620000–063FFFF | 0310000–031FFFF |
| SA50 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0640000–065FFFF | 0320000–032FFFF |
| SA51 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0660000–067FFFF | 0330000–033FFFF |
| SA52 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0680000–069FFFF | 0340000–034FFFF |
| SA53 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 06A0000–06BFFFF | 0350000–035FFFF |
| SA54 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 06C0000–06DFFFF | 0360000–036FFFF |
| SA55 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 06E0000–06FFFFFF | 0370000–037FFFF |
| SA56 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0700000–071FFFF | 0380000–038FFFF |
| SA57 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0720000–073FFFF | 0390000–039FFFF |
| SA58 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0740000–075FFFF | 03A0000–03AFFFF |
| SA59 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0760000–077FFFF | 03B0000–03BFFFF |
| SA60 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0780000–079FFFF | 03C0000–03CFFFF |
| SA61 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 07A0000–07BFFFF | 03D0000–03DFFFF |
| SA62 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 07C0000–07DFFFF | 03E0000–03EFFFF |
| SA63 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 07E0000–07FFFFFF | 03F0000–03FFFFFF |
| SA64 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0800000–081FFFF | 0400000–040FFFF |
| SA65 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0820000–083FFFF | 0410000–041FFFF |
| SA66 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0840000–085FFFF | 0420000–042FFFF |
| SA67 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0860000–087FFFF | 0430000–043FFFF |
| SA68 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0880000–089FFFF | 0440000–044FFFF |
| SA69 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 08A0000–08BFFFF | 0450000–045FFFF |
| SA70 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 08C0000–08DFFFF | 0460000–046FFFF |
| SA71 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 08E0000–08FFFFFF | 0470000–047FFFF |
| SA72 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0900000–091FFFF | 0480000–048FFFF |
| SA73 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0920000–093FFFF | 0490000–049FFFF |
| SA74 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0940000–095FFFF | 04A0000–04AFFFF |
| SA75 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0960000–097FFFF | 04B0000–04BFFFF |
| SA76 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0980000–099FFFF | 04C0000–04CFFFF |
| SA77 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 09A0000–09BFFFF | 04D0000–04DFFFF |
| SA78 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 09C0000–09DFFFF | 04E0000–04EFFFF |
| SA79 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 09E0000–09FFFFFF | 04F0000–04FFFFFF |
| SA80 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0A00000–0A1FFFF | 0500000–050FFFF |
| SA81 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0A20000–0A3FFFF | 0510000–051FFFF |
| SA82 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0A40000–0A5FFFF | 0520000–052FFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 3 of 12)

| Sector | A24-A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | | | |
| SA83 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0A60000–0A7FFFF | 0530000–053FFFF |
| SA84 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0A80000–0A9FFFF | 0540000–054FFFF |
| SA85 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 0AA0000–0ABFFFF | 0550000–055FFFF |
| SA86 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 0AC0000–0ADFFFF | 0560000–056FFFF |
| SA87 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 0AE0000–0AFFFFF | 0570000–057FFFF |
| SA88 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0B00000–0B1FFFF | 0580000–058FFFF |
| SA89 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0B20000–0B3FFFF | 0590000–059FFFF |
| SA90 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0B40000–0B5FFFF | 05A0000–05AFFFF |
| SA91 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0B60000–0B7FFFF | 05B0000–05BFFFF |
| SA92 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0B80000–0B9FFFF | 05C0000–05CFFFF |
| SA93 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 0BA0000–0BBFFFF | 05D0000–05DFFFF |
| SA94 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 0BC0000–0BDFFFF | 05E0000–05EFFFF |
| SA95 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 0BE0000–0BFFFFFF | 05F0000–05FFFFFF |
| SA96 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0C00000–0C1FFFF | 0600000–060FFFF |
| SA97 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0C20000–0C3FFFF | 0610000–061FFFF |
| SA98 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0C40000–0C5FFFF | 0620000–062FFFF |
| SA99 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0C60000–0C7FFFF | 0630000–063FFFF |
| SA100 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0C80000–0C9FFFF | 0640000–064FFFF |
| SA101 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 0CA0000–0CBFFFF | 0650000–065FFFF |
| SA102 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 0CC0000–0CDFFFF | 0660000–066FFFF |
| SA103 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 0CE0000–0CFFFFFF | 0670000–067FFFF |
| SA104 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0D00000–0D1FFFF | 0680000–068FFFF |
| SA105 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0D20000–0D3FFFF | 0690000–069FFFF |
| SA106 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0D40000–0D5FFFF | 06A0000–06AFFFF |
| SA107 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0D60000–0D7FFFF | 06B0000–06BFFFF |
| SA108 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0D80000–0D9FFFF | 06C0000–06CFFFF |
| SA109 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 0DA0000–0DBFFFF | 06D0000–06DFFFF |
| SA110 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 0DC0000–0DDFFFF | 06E0000–06EFFFF |
| SA111 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 0DE0000–0DFFFFFF | 06F0000–06FFFFFF |
| SA112 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0E00000–0E1FFFF | 0700000–070FFFF |
| SA113 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0E20000–0E3FFFF | 0710000–071FFFF |
| SA114 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0E40000–0E5FFFF | 0720000–072FFFF |
| SA115 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0E60000–0E7FFFF | 0730000–073FFFF |
| SA116 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0E80000–0E9FFFF | 0740000–074FFFF |
| SA117 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 0EA0000–0EBFFFF | 0750000–075FFFF |
| SA118 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 0EC0000–0EDFFFF | 0760000–076FFFF |
| SA119 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 0EE0000–0EFFFFFF | 0770000–077FFFF |
| SA120 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0F00000–0F1FFFF | 0780000–078FFFF |
| SA121 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0F20000–0F3FFFF | 0790000–079FFFF |
| SA122 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0F40000–0F5FFFF | 07A0000–07AFFFF |
| SA123 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0F60000–0F7FFFF | 07B0000–07BFFFF |
| SA124 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0F80000–0F9FFFF | 07C0000–07CFFFF |
| SA125 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 0FA0000–0FBFFFF | 07D0000–07DFFFF |
| SA126 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 0FC0000–0FDFFFF | 07E0000–07EFFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 4 of 12)

| Sector | A24-A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| SA127 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 0FE0000–0FFFFFFF | 07F0000–07FFFFFF |
| SA128 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1000000–101FFFFF | 0800000–080FFFFF |
| SA129 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1020000–103FFFFF | 0810000–081FFFFF |
| SA130 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1040000–105FFFFF | 0820000–082FFFFF |
| SA131 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1060000–017FFFFF | 0830000–083FFFFF |
| SA132 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1080000–109FFFFF | 0840000–084FFFFF |
| SA133 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 10A0000–10BFFFFF | 0850000–085FFFFF |
| SA134 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 10C0000–10DFFFFF | 0860000–086FFFFF |
| SA135 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 10E0000–10FFFFFFF | 0870000–087FFFFF |
| SA136 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1100000–111FFFFF | 0880000–088FFFFF |
| SA137 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1120000–113FFFFF | 0890000–089FFFFF |
| SA138 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1140000–115FFFFF | 08A0000–08AFFFFF |
| SA139 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1160000–117FFFFF | 08B0000–08BFFFFF |
| SA140 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1180000–119FFFFF | 08C0000–08CFFFFF |
| SA141 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 11A0000–11BFFFFF | 08D0000–08DFFFFF |
| SA142 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 11C0000–11DFFFFF | 08E0000–08EFFFFF |
| SA143 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 11E0000–11FFFFFFF | 08F0000–08FFFFFFF |
| SA144 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 1200000–121FFFFF | 0900000–090FFFFF |
| SA145 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1220000–123FFFFF | 0910000–091FFFFF |
| SA146 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1240000–125FFFFF | 0920000–092FFFFF |
| SA147 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1260000–127FFFFF | 0930000–093FFFFF |
| SA148 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1280000–129FFFFF | 0940000–094FFFFF |
| SA149 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 12A0000–12BFFFFF | 0950000–095FFFFF |
| SA150 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 12C0000–12DFFFFF | 0960000–096FFFFF |
| SA151 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 12E0000–12FFFFFFF | 0970000–097FFFFF |
| SA152 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1300000–131FFFFF | 0980000–098FFFFF |
| SA153 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1320000–133FFFFF | 0990000–099FFFFF |
| SA154 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1340000–135FFFFF | 09A0000–09AFFFFF |
| SA155 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1360000–137FFFFF | 09B0000–09BFFFFF |
| SA156 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1380000–139FFFFF | 09C0000–09CFFFFF |
| SA157 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 13A0000–13BFFFFF | 09D0000–09DFFFFF |
| SA158 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 13C0000–13DFFFFF | 09E0000–09EFFFFF |
| SA159 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 13E0000–13FFFFFFF | 09F0000–09FFFFFFF |
| SA160 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1400000–141FFFFF | 0A00000–0A0FFFFF |
| SA161 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1420000–143FFFFF | 0A10000–0A1FFFFF |
| SA162 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1440000–145FFFFF | 0A20000–0A2FFFFF |
| SA163 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1460000–147FFFFF | 0A30000–0A3FFFFF |
| SA164 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1480000–149FFFFF | 0A40000–0A4FFFFF |
| SA165 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 14A0000–14BFFFFF | 0A50000–0A5FFFFF |
| SA166 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 14C0000–14DFFFFF | 0A60000–0A6FFFFF |
| SA167 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 14E0000–14FFFFFFF | 0A70000–0A7FFFFF |
| SA168 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1500000–151FFFFF | 0A80000–0A8FFFFF |
| SA169 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1520000–153FFFFF | 0A90000–0A9FFFFF |
| SA170 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1540000–155FFFFF | 0AA0000–0AAFFFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 5 of 12)

| Sector | A24–A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | | | |
| SA171 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1560000–157FFFF | OAB0000–OABFFFF |
| SA172 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1580000–159FFFF | OAC0000–OACFFFF |
| SA173 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 15A0000–15BFFFF | OAD0000–OADFFFF |
| SA174 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 15C0000–15DFFFF | OAE0000–OAEFFFF |
| SA175 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 15E0000–15FFFFFF | OAF0000–OAFFFFF |
| SA176 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 160000–161FFFF | OB00000–OB0FFFF |
| SA177 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1620000–163FFFF | OB10000–OB1FFFF |
| SA178 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1640000–165FFFF | OB20000–OB2FFFF |
| SA179 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1660000–167FFFF | OB30000–OB3FFFF |
| SA180 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1680000–169FFFF | OB40000–OB4FFFF |
| SA181 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 16A0000–16BFFFF | OB50000–OB5FFFF |
| SA182 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 16C0000–16DFFFF | OB60000–OB6FFFF |
| SA183 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 16E0000–16FFFFFF | OB70000–OB7FFFF |
| SA184 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1700000–171FFFF | OB80000–OB8FFFF |
| SA185 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1720000–173FFFF | OB90000–OB9FFFF |
| SA186 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1740000–175FFFF | OBA0000–OBAFFFF |
| SA187 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1760000–177FFFF | OB00000–OB0FFFF |
| SA188 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1780000–179FFFF | OBC0000–OBCFFFF |
| SA189 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 17A0000–17BFFFF | OB00000–OB0FFFF |
| SA190 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 17C0000–17DFFFF | OBE0000–OBEFFFF |
| SA191 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 17E0000–17FFFFFF | 0BF0000–0BFFFFFF |
| SA192 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1800000–181FFFF | OC00000–OC0FFFF |
| SA193 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1820000–183FFFF | OC10000–OC1FFFF |
| SA194 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1840000–185FFFF | OC20000–OC2FFFF |
| SA195 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1860000–187FFFF | OC30000–OC3FFFF |
| SA196 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1880000–189FFFF | OC40000–OC4FFFF |
| SA197 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 18A0000–18BFFFF | OC50000–OC5FFFF |
| SA198 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 18C0000–18DFFFF | OC60000–OC6FFFF |
| SA199 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 18E0000–18FFFFFF | OC70000–OC7FFFF |
| SA200 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1900000–191FFFF | OC80000–OC8FFFF |
| SA201 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1920000–193FFFF | OC90000–OC9FFFF |
| SA202 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1940000–195FFFF | OCA0000–OCAFFFF |
| SA203 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1960000–197FFFF | OCB0000–OCBFFFF |
| SA204 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1980000–199FFFF | OCC0000–OCCFFFF |
| SA205 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 19A0000–19BFFFF | OC00000–OC0FFFF |
| SA206 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 19C0000–19DFFFF | OCE0000–OCEFFFF |
| SA207 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 19E0000–19FFFFFF | OCF0000–OCFFFFFF |
| SA208 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 1A00000–1A1FFFF | OD00000–OD0FFFF |
| SA209 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1A20000–1A3FFFF | OD10000–OD1FFFF |
| SA210 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1A40000–1A5FFFF | OD20000–OD2FFFF |
| SA211 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1A60000–1A7FFFF | OD30000–OD3FFFF |
| SA212 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1A80000–1A9FFFF | OD40000–OD4FFFF |
| SA213 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 1AA0000–1ABFFFF | OD50000–OD5FFFF |
| SA214 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 1AC0000–1ADFFFF | OD60000–OD6FFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 6 of 12)

| Sector | A24–A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | | | |
| SA215 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 1AE0000–1AFFFFFF | 0D70000–0D7FFFF |
| SA216 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1B00000–1B1FFFF | 0D80000–0D8FFFF |
| SA217 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1B20000–1B3FFFF | 0D90000–0D9FFFF |
| SA218 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1B40000–1B5FFFF | 0DA0000–0DAFFFF |
| SA219 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1B60000–1B7FFFF | 0DB0000–0DBFFFF |
| SA220 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1B80000–1B9FFFF | 0DC0000–0DCFFFF |
| SA221 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 1BA0000–1BBFFFF | 0DD0000–0DDFFFF |
| SA222 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 1BC0000–1BDFFFF | 0DE0000–0DEFFFF |
| SA223 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 1BE0000–1BFFFFFF | 0DF0000–0DFFFFFF |
| SA224 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1C00000–1C1FFFF | 0E00000–0E0FFFF |
| SA225 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1C20000–1C3FFFF | 0E10000–0E1FFFF |
| SA226 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1C40000–1C5FFFF | 0E20000–0E2FFFF |
| SA227 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1C60000–1C7FFFF | 0E30000–0E3FFFF |
| SA228 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1C80000–1C9FFFF | 0E40000–0E4FFFF |
| SA229 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 1CA0000–1CBFFFF | 0E50000–0E5FFFF |
| SA230 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 1CC0000–1CDFFFF | 0E60000–0E6FFFF |
| SA231 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 1CE0000–1CFFFFFF | 0E70000–0E7FFFF |
| SA232 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1D00000–1D1FFFF | 0E80000–0E8FFFF |
| SA233 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1D20000–1D3FFFF | 0E90000–0E9FFFF |
| SA234 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1D40000–1D5FFFF | 0EA0000–0EAFFFF |
| SA235 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1D60000–1D7FFFF | 0EB0000–0EBFFFF |
| SA236 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1D80000–1D9FFFF | 0EC0000–0ECFFFF |
| SA237 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 1DA0000–1DBFFFF | 0ED0000–0EDFFFF |
| SA238 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 1DC0000–1DDFFFF | 0EE0000–0EEFFFF |
| SA239 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 1DE0000–1DFFFFFF | 0EF0000–0EFFFFFF |
| SA240 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 1E00000–1E1FFFF | 0F00000–0F0FFFF |
| SA241 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1E20000–1E3FFFF | 0F10000–0F1FFFF |
| SA242 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1E40000–1E5FFFF | 0F20000–0F2FFFF |
| SA243 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1E60000–1E7FFFF | 0F30000–0F3FFFF |
| SA244 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1E80000–1E9FFFF | 0F40000–0F4FFFF |
| SA245 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 1EA0000–1EBFFFF | 0F50000–0F5FFFF |
| SA246 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 1EC0000–1EDFFFF | 0F60000–0F6FFFF |
| SA247 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 1EE0000–1EFFFFFF | 0F70000–0F7FFFF |
| SA248 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1F00000–1F1FFFF | 0F80000–0F8FFFF |
| SA249 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1F20000–1F3FFFF | 0F90000–0F9FFFF |
| SA250 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1F40000–1F5FFFF | 0FA0000–0FAFFFF |
| SA251 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1F60000–1F7FFFF | 0FB0000–0FBFFFF |
| SA252 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1F80000–1F9FFFF | 0FC0000–0FCFFFF |
| SA253 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 1FA0000–1FBFFFF | 0FD0000–0FDFFFF |
| SA254 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 1FC0000–1FDFFFF | 0FE0000–0FEFFFF |
| SA255 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 1FE0000–1FFFFFF | 0FF0000–0FFFFFF |
| SA256 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 2000000–201FFFF | 1000000–100FFFF |
| SA257 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 2020000–203FFFF | 1010000–101FFFF |
| SA258 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 2040000–205FFFF | 1020000–102FFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 7 of 12)

| Sector | A24–A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | | | | | | | | | | | | |
| SA259 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 2060000–207FFFF | 1030000–103FFFF |
| SA260 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 2080000–209FFFF | 1040000–104FFFF |
| SA261 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 20A0000–20BFFFF | 1050000–105FFFF |
| SA262 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 20C0000–20DFFFF | 1060000–106FFFF |
| SA263 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 20E0000–20FFFFFF | 1070000–107FFFF |
| SA264 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 2100000–211FFFF | 1080000–108FFFF |
| SA265 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 2120000–213FFFF | 1090000–109FFFF |
| SA266 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 2140000–215FFFF | 10A0000–10AFFFF |
| SA267 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 2160000–217FFFF | 10B0000–10BFFFF |
| SA268 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 2180000–219FFFF | 10C0000–10CFFFF |
| SA269 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 21A0000–21BFFFF | 10D0000–10DFFFF |
| SA270 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 21C0000–21DFFFF | 10E0000–10EFFFF |
| SA271 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 21E0000–21FFFFFF | 10F0000–10FFFFFF |
| SA272 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 2200000–221FFFF | 1100000–110FFFF |
| SA273 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 2220000–223FFFF | 1110000–111FFFF |
| SA274 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 2240000–225FFFF | 1120000–112FFFF |
| SA275 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 2260000–227FFFF | 1130000–113FFFF |
| SA276 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 2280000–229FFFF | 1140000–114FFFF |
| SA277 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 22A0000–22BFFFF | 1150000–115FFFF |
| SA278 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 22C0000–22DFFFF | 1160000–116FFFF |
| SA279 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 22E0000–22FFFFFF | 1170000–117FFFF |
| SA280 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 2300000–231FFFF | 1180000–118FFFF |
| SA281 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 2320000–233FFFF | 1190000–119FFFF |
| SA282 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 2340000–235FFFF | 11A0000–11AFFFF |
| SA283 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 2360000–237FFFF | 11B0000–11BFFFF |
| SA284 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 2380000–239FFFF | 11C0000–11CFFFF |
| SA285 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 23A0000–23BFFFF | 11D0000–11DFFFF |
| SA286 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 23C0000–23DFFFF | 11E0000–11EFFFF |
| SA287 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 23E0000–23FFFFFF | 11F0000–11FFFFFF |
| SA288 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 2400000–241FFFF | 1200000–120FFFF |
| SA289 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 2420000–243FFFF | 1210000–121FFFF |
| SA290 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 2440000–245FFFF | 1220000–122FFFF |
| SA291 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 2460000–247FFFF | 1230000–123FFFF |
| SA292 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 2480000–249FFFF | 1240000–124FFFF |
| SA293 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 24A0000–24BFFFF | 1250000–125FFFF |
| SA294 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 24C0000–24DFFFF | 1260000–126FFFF |
| SA295 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 24E0000–24FFFFFF | 1270000–127FFFF |
| SA296 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 2500000–251FFFF | 1280000–128FFFF |
| SA297 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 2520000–253FFFF | 1290000–129FFFF |
| SA298 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 2540000–255FFFF | 12A0000–12AFFFF |
| SA299 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 2560000–257FFFF | 12B0000–12BFFFF |
| SA300 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 2580000–259FFFF | 12C0000–12CFFFF |
| SA301 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 25A0000–25BFFFF | 12D0000–12DFFFF |
| SA302 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 25C0000–25DFFFF | 12E0000–12EFFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 8 of 12)

| Sector | A24-A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | | | |
| SA303 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 25E0000–25FFFFFF | 12F0000–12FFFFFF |
| SA304 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 2600000–261FFFF | 1300000–130FFFF |
| SA305 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 2620000–263FFFF | 1310000–131FFFF |
| SA306 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 2640000–265FFFF | 1320000–132FFFF |
| SA307 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 2660000–267FFFF | 1330000–133FFFF |
| SA308 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 2680000–269FFFF | 1340000–134FFFF |
| SA309 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 26A0000–26BFFFF | 1350000–135FFFF |
| SA310 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 26C0000–26DFFFF | 1360000–136FFFF |
| SA311 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 26E0000–26FFFFFF | 1370000–137FFFF |
| SA312 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 2700000–271FFFF | 1380000–138FFFF |
| SA313 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 2720000–273FFFF | 1390000–139FFFF |
| SA314 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 2740000–275FFFF | 13A0000–13AFFFF |
| SA315 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 2760000–277FFFF | 13B0000–13BFFFF |
| SA316 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 2780000–279FFFF | 13C0000–13CFFFF |
| SA317 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 27A0000–27BFFFF | 13D0000–13DFFFF |
| SA318 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 27C0000–27DFFFF | 13E0000–13EFFFF |
| SA319 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 27E0000–27FFFFFF | 13F0000–13FFFFFF |
| SA320 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 2800000–281FFFF | 1400000–140FFFF |
| SA321 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 2820000–283FFFF | 1410000–141FFFF |
| SA322 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 2840000–285FFFF | 1420000–142FFFF |
| SA323 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 2860000–287FFFF | 1430000–143FFFF |
| SA324 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 2880000–289FFFF | 1440000–144FFFF |
| SA325 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 28A0000–28BFFFF | 1450000–145FFFF |
| SA326 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 28C0000–28DFFFF | 1460000–146FFFF |
| SA327 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 28E0000–28FFFFFF | 1470000–147FFFF |
| SA328 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 2900000–291FFFF | 1480000–148FFFF |
| SA329 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 2920000–293FFFF | 1490000–149FFFF |
| SA330 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 2940000–295FFFF | 14A0000–14AFFFF |
| SA331 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 2960000–297FFFF | 14B0000–14BFFFF |
| SA332 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 2980000–299FFFF | 14C0000–14CFFFF |
| SA333 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 29A0000–29BFFFF | 14D0000–14DFFFF |
| SA334 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 29C0000–29DFFFF | 14E0000–14EFFFF |
| SA335 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 29E0000–29FFFFFF | 14F0000–14FFFFFF |
| SA336 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 2A00000–2A1FFFF | 1500000–150FFFF |
| SA337 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 2A20000–2A3FFFF | 1510000–151FFFF |
| SA338 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 2A40000–2A5FFFF | 1520000–152FFFF |
| SA339 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 2A60000–2A7FFFF | 1530000–153FFFF |
| SA340 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 2A80000–2A9FFFF | 1540000–154FFFF |
| SA341 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 2AA0000–2ABFFFF | 1550000–155FFFF |
| SA342 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 2AC0000–2ADFFFF | 1560000–156FFFF |
| SA343 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 2AE00000–2EFFFFFF | 1570000–157FFFF |
| SA344 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 2B00000–2B1FFFF | 1580000–158FFFF |
| SA345 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 2B20000–2B3FFFF | 1590000–159FFFF |
| SA346 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 2B40000–2B5FFFF | 15A0000–15AFFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 9 of 12)

| Sector | A24-A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | | | |
| SA347 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 2B60000–2B7FFFF | 15B0000–15BFFFF |
| SA348 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 2B80000–2B9FFFF | 15C0000–15CFFFF |
| SA349 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 2BA0000–2BBFFFF | 15D0000–15DFFFF |
| SA350 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 2BC0000–2DFFFFFF | 15E0000–15EFFFF |
| SA351 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 2BE0000–2BFFFFFF | 15F0000–15FFFFFF |
| SA352 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 2C00000–2C1FFFF | 1600000–160FFFF |
| SA353 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 2C20000–2C3FFFF | 1610000–161FFFF |
| SA354 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 2C40000–2C5FFFF | 1620000–162FFFF |
| SA355 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 2C60000–2C7FFFF | 1630000–163FFFF |
| SA356 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 2C80000–2C9FFFF | 1640000–164FFFF |
| SA357 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 2CA0000–2CBFFFF | 1650000–165FFFF |
| SA358 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 2CC0000–2CDFFFF | 1660000–166FFFF |
| SA359 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 2CE0000–2CFFFFFF | 1670000–167FFFF |
| SA360 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 2D00000–2D1FFFF | 1680000–168FFFF |
| SA361 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 2D20000–2D3FFFF | 1690000–169FFFF |
| SA362 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 2D40000–2D5FFFF | 16A0000–16AFFFF |
| SA363 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 2D60000–2D7FFFF | 16B0000–16BFFFF |
| SA364 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 2D80000–2D9FFFF | 16C0000–16CFFFF |
| SA365 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 2DA0000–2DBFFFF | 16D0000–16DFFFF |
| SA366 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 2DC0000–2DDFFFF | 16E0000–16EFFFF |
| SA367 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 2DE0000–2DFFFFFF | 16F0000–16FFFFFF |
| SA368 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 2E00000–2E1FFFF | 1700000–170FFFF |
| SA369 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 2E20000–2E3FFFF | 1710000–171FFFF |
| SA370 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 2E40000–2E5FFFF | 1720000–172FFFF |
| SA371 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 2E60000–2E7FFFF | 1730000–173FFFF |
| SA372 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 2E80000–2E9FFFF | 1740000–174FFFF |
| SA373 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 2EA0000–2EBFFFF | 1750000–175FFFF |
| SA374 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 2EC0000–2EDFFFF | 1760000–176FFFF |
| SA375 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 2EE0000–2EFFFFFF | 1770000–177FFFF |
| SA376 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 2F00000–2F1FFFF | 1780000–178FFFF |
| SA377 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 2F20000–2F3FFFF | 1790000–179FFFF |
| SA378 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 2F40000–2F5FFFF | 17A0000–17AFFFF |
| SA379 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 2F60000–2F7FFFF | 17B0000–17BFFFF |
| SA380 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 2F80000–2F9FFFF | 17C0000–17CFFFF |
| SA381 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 2FA0000–2FBFFFF | 17D0000–17DFFFF |
| SA382 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 2FC0000–2FDFFFF | 17E0000–17EFFFF |
| SA383 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 3FE0000–3FFFFFF | 17F0000–17FFFFFF |
| SA384 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 3000000–301FFFF | 1800000–180FFFF |
| SA385 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 3020000–303FFFF | 1810000–181FFFF |
| SA386 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 3040000–305FFFF | 1820000–182FFFF |
| SA387 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 3060000–307FFFF | 1830000–183FFFF |
| SA388 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 3080000–309FFFF | 1840000–184FFFF |
| SA389 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 30A0000–30BFFFF | 1850000–185FFFF |
| SA390 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 30C0000–30DFFFF | 1860000–186FFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 10 of 12)

| Sector | A24–A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | | | |
| SA391 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 30E0000–30FFFFFF | 1870000–187FFFF |
| SA392 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 3100000–311FFFF | 1880000–188FFFF |
| SA393 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 3120000–313FFFF | 1890000–189FFFF |
| SA394 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 3140000–315FFFF | 18A0000–18AFFFF |
| SA395 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 3160000–317FFFF | 18B0000–18BFFFF |
| SA396 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 3180000–319FFFF | 18C0000–18CFFFF |
| SA397 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 31A0000–31BFFFF | 18D0000–18DFFFF |
| SA398 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 31C0000–31DFFFF | 18E0000–18EFFFF |
| SA399 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 31E0000–31FFFFFF | 18F0000–18FFFFFF |
| SA400 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 3200000–321FFFF | 1900000–190FFFF |
| SA401 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 3220000–323FFFF | 1910000–191FFFF |
| SA402 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 3240000–325FFFF | 1920000–192FFFF |
| SA403 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 3260000–327FFFF | 1930000–193FFFF |
| SA404 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 3280000–329FFFF | 1940000–194FFFF |
| SA405 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 32A0000–32BFFFF | 1950000–195FFFF |
| SA406 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 32C0000–32DFFFF | 1960000–196FFFF |
| SA407 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 32E0000–32FFFFFF | 1970000–197FFFF |
| SA408 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 3300000–331FFFF | 1980000–198FFFF |
| SA409 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 3320000–333FFFF | 1990000–199FFFF |
| SA410 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 3340000–335FFFF | 19A0000–19AFFFF |
| SA411 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 3360000–337FFFF | 19B0000–19BFFFF |
| SA412 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 3380000–339FFFF | 19C0000–19CFFFF |
| SA413 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 33A0000–33BFFFF | 19D0000–19DFFFF |
| SA414 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 33C0000–33DFFFF | 19E0000–19EFFFF |
| SA415 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 33E0000–33FFFFFF | 19F0000–19FFFFFF |
| SA416 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 3400000–341FFFF | 1A00000–1A0FFFF |
| SA417 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 3420000–343FFFF | 1A10000–1A1FFFF |
| SA418 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 3440000–345FFFF | 1A20000–1A2FFFF |
| SA419 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 3460000–347FFFF | 1A30000–1A3FFFF |
| SA420 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 3480000–349FFFF | 1A40000–1A4FFFF |
| SA421 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 34A0000–34BFFFF | 1A50000–1A5FFFF |
| SA422 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 34C0000–34DFFFF | 1A60000–1A6FFFF |
| SA423 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 34E0000–34FFFFFF | 1A70000–1A7FFFF |
| SA424 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 3500000–351FFFF | 1A80000–1A8FFFF |
| SA425 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 3520000–353FFFF | 1A90000–1A9FFFF |
| SA426 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 3540000–355FFFF | 1AA0000–1AAFFFF |
| SA427 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 3560000–357FFFF | 1AB0000–1ABFFFF |
| SA428 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 3580000–359FFFF | 1AC0000–1ACFFFF |
| SA429 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 35A0000–35BFFFF | 1AD0000–1ADFFFF |
| SA430 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 35C0000–35DFFFF | 1AE0000–1AEFFFF |
| SA431 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 35E0000–35FFFFFF | 1AF0000–1AFFFFFF |
| SA432 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 3600000–361FFFF | 1B00000–1B0FFFF |
| SA433 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 3620000–363FFFF | 1B10000–1B1FFFF |
| SA434 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 3640000–365FFFF | 1B20000–1B2FFFF |

Table 2. Sector Address Table–S29GL512N (Sheet II of 12)

| Sector | A24-A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | | | |
| SA435 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 3660000–367FFFF | 1B30000–1B3FFFF |
| SA436 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 3680000–369FFFF | 1B40000–1B4FFFF |
| SA437 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 36A0000–36BFFFF | 1B50000–1B5FFFF |
| SA438 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 36C0000–36DFFFF | 1B60000–1B6FFFF |
| SA439 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 36E0000–36FFFFFF | 1B70000–1B7FFFF |
| SA440 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 3700000–371FFFF | 1B80000–1B8FFFF |
| SA441 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 3720000–373FFFF | 1B90000–1B9FFFF |
| SA442 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 3740000–375FFFF | 1BA0000–1BAFFFF |
| SA443 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 3760000–377FFFF | 1BB0000–1BBFFFF |
| SA444 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 3780000–379FFFF | 1BC0000–1BCFFFF |
| SA445 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 37A0000–37BFFFF | 1BD0000–1BDFFFF |
| SA446 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 37C0000–37DFFFF | 1BE0000–1BEFFFF |
| SA447 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 37E0000–37FFFFFF | 1BF0000–1BFFFFFF |
| SA448 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 3800000–381FFFF | 1C00000–1C0FFFF |
| SA449 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 3820000–383FFFF | 1C10000–1C1FFFF |
| SA450 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 3840000–385FFFF | 1C20000–1C2FFFF |
| SA451 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 3860000–387FFFF | 1C30000–1C3FFFF |
| SA452 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 3880000–389FFFF | 1C40000–1C4FFFF |
| SA453 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 38A0000–38BFFFF | 1C50000–1C5FFFF |
| SA454 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 38C0000–38DFFFF | 1C60000–1C6FFFF |
| SA455 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 38E0000–38FFFFFF | 1C70000–1C7FFFF |
| SA456 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 3900000–391FFFF | 1C80000–1C8FFFF |
| SA457 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 3920000–393FFFF | 1C90000–1C9FFFF |
| SA458 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 3940000–395FFFF | 1CA0000–1CAFFFF |
| SA459 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 3960000–397FFFF | 1CB0000–1CBFFFF |
| SA460 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 3980000–399FFFF | 1CC0000–1CCFFFF |
| SA461 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 39A0000–39BFFFF | 1CD0000–1CDFFFF |
| SA462 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 39C0000–39DFFFF | 1CE0000–1CEFFFF |
| SA463 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 39E0000–39FFFFFF | 1CF0000–1CFFFFFF |
| SA464 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 3A00000–3A1FFFF | 1D00000–1D0FFFF |
| SA465 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 3A20000–3A3FFFF | 1D10000–1D1FFFF |
| SA466 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 3A40000–3A5FFFF | 1D20000–1D2FFFF |
| SA467 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 3A60000–3A7FFFF | 1D30000–1D3FFFF |
| SA468 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 3A80000–3A9FFFF | 1D40000–1D4FFFF |
| SA469 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 3AA0000–3ABFFFF | 1D50000–1D5FFFF |
| SA470 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 3AC0000–3ADFFFF | 1D60000–1D6FFFF |
| SA471 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 3AE0000–3AFFFFFF | 1D70000–1D7FFFF |
| SA472 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 3B00000–3B1FFFF | 1D80000–1D8FFFF |
| SA473 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 3B20000–3B3FFFF | 1D90000–1D9FFFF |
| SA474 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 3B40000–3B5FFFF | 1DA0000–1DAFFFF |
| SA475 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 3B60000–3B7FFFF | 1DB0000–1DBFFFF |
| SA476 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 3B80000–3B9FFFF | 1DC0000–1DCFFFF |
| SA477 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 3BA0000–3BBFFFF | 1DD0000–1DDFFFF |
| SA478 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 3BC0000–3BDFFFF | 1DE0000–1DEFFFF |

Table 2. Sector Address Table–S29GL512N (Sheet 12 of 12)

| Sector | A24–A16 | | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | | | |
| SA479 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 3BE0000–3BFFFFFF | 1DF0000–1DFFFFFF |
| SA480 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 3C00000–3C1FFFF | 1E00000–1E0FFFF |
| SA481 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 3C20000–3C3FFFF | 1E10000–1E1FFFF |
| SA482 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 3C40000–3C5FFFF | 1E20000–1E2FFFF |
| SA483 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 3C60000–3C7FFFF | 1E30000–1E3FFFF |
| SA484 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 3C80000–3C9FFFF | 1E40000–1E4FFFF |
| SA485 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 3CA0000–3CBFFFF | 1E50000–1E5FFFF |
| SA486 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 3CC0000–3CDFFFF | 1E60000–1E6FFFF |
| SA487 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 3CE0000–3CFFFFFF | 1E70000–1E7FFFF |
| SA488 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 3D00000–3D1FFFF | 1E80000–1E8FFFF |
| SA489 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 3D20000–3D3FFFF | 1E90000–1E9FFFF |
| SA490 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 3D40000–3D5FFFF | 1EA0000–1EAFFFF |
| SA491 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 3D60000–3D7FFFF | 1EB0000–1EBFFFF |
| SA492 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 3D80000–3D9FFFF | 1EC0000–1ECFFFF |
| SA493 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 3DA0000–3DBFFFF | 1ED0000–1EDFFFF |
| SA494 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 3DC0000–3DDFFFF | 1EE0000–1EEFFFF |
| SA495 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 3DE0000–3DFFFFFF | 1EF0000–1EFFFFFF |
| SA496 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 3E00000–3E1FFFF | 1F00000–1F0FFFF |
| SA497 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 3E20000–3E3FFFF | 1F10000–1F1FFFF |
| SA498 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 3E40000–3E5FFFF | 1F20000–1F2FFFF |
| SA499 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 3E60000–3E7FFFF | 1F30000–1F3FFFF |
| SA500 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 3E80000–3E9FFFF | 1F40000–1F4FFFF |
| SA501 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 3EA0000–3EBFFFF | 1F50000–1F5FFFF |
| SA502 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 3EC0000–3EDFFFF | 1F60000–1F6FFFF |
| SA503 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 3EE0000–3EFFFFFF | 1F70000–1F7FFFF |
| SA504 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 3F00000–3F1FFFF | 1F80000–1F8FFFF |
| SA505 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 3F20000–3F3FFFF | 1F90000–1F9FFFF |
| SA506 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 3F40000–3F5FFFF | 1FA0000–1FAFFFF |
| SA507 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 3F60000–3F7FFFF | 1FB0000–1FBFFFF |
| SA508 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 3F80000–3F9FFFF | 1FC0000–1FCFFFF |
| SA509 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 3FA0000–3FBFFFF | 1FD0000–1FDFFFF |
| SA510 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 3FC0000–3FDFFFF | 1FE0000–1FEFFFF |
| SA511 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 3FE0000–3FFFFFF | 1FF0000–1FFFFFF |

Table 3. Sector Address Table–S29GL256N (Sheet I of 6)

| Sector | A23–A16 | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| SA0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0000000–001FFFF | 0000000–000FFFF |
| SA1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0020000–003FFFF | 0010000–001FFFF |
| SA2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0040000–005FFFF | 0020000–002FFFF |
| SA3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0060000–007FFFF | 0030000–003FFFF |
| SA4 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0080000–009FFFF | 0040000–004FFFF |
| SA5 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 00A0000–00BFFFF | 0050000–005FFFF |
| SA6 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 00C0000–00DFFFF | 0060000–006FFFF |
| SA7 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 00E0000–00FFFFFF | 0070000–007FFFF |
| SA8 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0100000–011FFFF | 0080000–008FFFF |
| SA9 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0120000–013FFFF | 0090000–009FFFF |
| SA10 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0140000–015FFFF | 00A0000–00AFFFF |
| SA11 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0160000–017FFFF | 00B0000–00BFFFF |
| SA12 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0180000–019FFFF | 00C0000–00CFFFF |
| SA13 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 01A0000–01BFFFF | 00D0000–00DFFFF |
| SA14 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 01C0000–01DFFFF | 00E0000–00EFFFF |
| SA15 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 01E0000–01FFFFFF | 00F0000–00FFFFFF |
| SA16 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0200000–021FFFF | 0100000–010FFFF |
| SA17 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0220000–023FFFF | 0110000–011FFFF |
| SA18 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0240000–025FFFF | 0120000–012FFFF |
| SA19 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0260000–027FFFF | 0130000–013FFFF |
| SA20 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0280000–029FFFF | 0140000–014FFFF |
| SA21 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 02A0000–02BFFFF | 0150000–015FFFF |
| SA22 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 02C0000–02DFFFF | 0160000–016FFFF |
| SA23 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 02E0000–02FFFFFF | 0170000–017FFFF |
| SA24 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0300000–031FFFF | 0180000–018FFFF |
| SA25 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0320000–033FFFF | 0190000–019FFFF |
| SA26 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0340000–035FFFF | 01A0000–01AFFFF |
| SA27 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0360000–037FFFF | 01B0000–01BFFFF |
| SA28 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0380000–039FFFF | 01C0000–01CFFFF |
| SA29 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 03A0000–03BFFFF | 01D0000–01DFFFF |
| SA30 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 03C0000–03DFFFF | 01E0000–01EFFFF |
| SA31 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 03E0000–03FFFFFF | 01F0000–01FFFFFF |
| SA32 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0400000–041FFFF | 0200000–020FFFF |
| SA33 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0420000–043FFFF | 0210000–021FFFF |
| SA34 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0440000–045FFFF | 0220000–022FFFF |
| SA35 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0460000–047FFFF | 0230000–023FFFF |
| SA36 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0480000–049FFFF | 0240000–024FFFF |
| SA37 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 04A0000–04BFFFF | 0250000–025FFFF |
| SA38 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 04C0000–04DFFFF | 0260000–026FFFF |
| SA39 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 04E0000–04FFFFFF | 0270000–027FFFF |
| SA40 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0500000–051FFFF | 0280000–028FFFF |
| SA41 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0520000–053FFFF | 0290000–029FFFF |
| SA42 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0540000–055FFFF | 02A0000–02AFFFF |

Table 3. Sector Address Table–S29GL256N (Sheet 2 of 6)

| Sector | A23–A16 | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | | | |
| SA43 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0560000–057FFFF | 02B0000–02BFFFF |
| SA44 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0580000–059FFFF | 02C0000–02CFFFF |
| SA45 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 05A0000–05BFFFF | 02D0000–02DFFFF |
| SA46 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 05C0000–05DFFFF | 02E0000–02EFFFF |
| SA47 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 05E0000–05FFFFFF | 02F0000–02FFFFFF |
| SA48 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0600000–061FFFF | 0300000–030FFFF |
| SA49 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0620000–063FFFF | 0310000–031FFFF |
| SA50 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0640000–065FFFF | 0320000–032FFFF |
| SA51 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0660000–067FFFF | 0330000–033FFFF |
| SA52 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0680000–069FFFF | 0340000–034FFFF |
| SA53 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 06A0000–06BFFFF | 0350000–035FFFF |
| SA54 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 06C0000–06DFFFF | 0360000–036FFFF |
| SA55 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 06E0000–06FFFFFF | 0370000–037FFFF |
| SA56 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0700000–071FFFF | 0380000–038FFFF |
| SA57 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0720000–073FFFF | 0390000–039FFFF |
| SA58 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0740000–075FFFF | 03A0000–03AFFFF |
| SA59 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0760000–077FFFF | 03B0000–03BFFFF |
| SA60 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0780000–079FFFF | 03C0000–03CFFFF |
| SA61 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 07A0000–7BFFFF | 03D0000–03DFFFF |
| SA62 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 07C0000–07DFFFF | 03E0000–03EFFFF |
| SA63 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 07E0000–07FFFFFF0 | 03F0000–03FFFFFF |
| SA64 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0800000–081FFFF | 0400000–040FFFF |
| SA65 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0820000–083FFFF | 0410000–041FFFF |
| SA66 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0840000–085FFFF | 0420000–042FFFF |
| SA67 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0860000–087FFFF | 0430000–043FFFF |
| SA68 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0880000–089FFFF | 0440000–044FFFF |
| SA69 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 08A0000–08BFFFF | 0450000–045FFFF |
| SA70 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 08C0000–08DFFFF | 0460000–046FFFF |
| SA71 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 08E0000–08FFFFFF | 0470000–047FFFF |
| SA72 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0900000–091FFFF | 0480000–048FFFF |
| SA73 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0920000–093FFFF | 0490000–049FFFF |
| SA74 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0940000–095FFFF | 04A0000–04AFFFF |
| SA75 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0960000–097FFFF | 04B0000–04BFFFF |
| SA76 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0980000–099FFFF | 04C0000–04CFFFF |
| SA77 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 09A0000–09BFFFF | 04D0000–04DFFFF |
| SA78 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 09C0000–09DFFFF | 04E0000–04EFFFF |
| SA79 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 09E0000–09FFFFFF | 04F0000–04FFFFFF |
| SA80 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0A00000–0A1FFFF | 0500000–050FFFF |
| SA81 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0A20000–0A3FFFF | 0510000–051FFFF |
| SA82 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0A40000–0A5FFFF | 0520000–052FFFF |
| SA83 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0A60000–0A7FFFF | 0530000–053FFFF |
| SA84 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0A80000–0A9FFFF | 0540000–054FFFF |
| SA85 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 0AA0000–0ABFFFF | 0550000–055FFFF |
| SA86 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 0AC0000–0ADFFFF | 0560000–056FFFF |

Table 3. Sector Address Table–S29GL256N (Sheet 3 of 6)

| Sector | A23–A16 | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | | | |
| SA87 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 0AE0000–AEFFFFFF | 0570000–057FFFF |
| SA88 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0B00000–0B1FFFF | 0580000–058FFFF |
| SA89 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0B20000–0B3FFFF | 0590000–059FFFF |
| SA90 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0B40000–0B5FFFF | 05A0000–05AFFFF |
| SA91 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0B60000–0B7FFFF | 05B0000–05BFFFF |
| SA92 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0B80000–0B9FFFF | 05C0000–05CFFFF |
| SA93 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 0BA0000–0BBFFFF | 05D0000–05DFFFF |
| SA94 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 0BC0000–0BDFFFF | 05E0000–05EFFFF |
| SA95 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 0BE0000–0BFFFFF | 05F0000–05FFFFFF |
| SA96 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0C00000–0C1FFFF | 0600000–060FFFF |
| SA97 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0C20000–0C3FFFF | 0610000–061FFFF |
| SA98 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0C40000–0C5FFFF | 0620000–062FFFF |
| SA99 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0C60000–0C7FFFF | 0630000–063FFFF |
| SA100 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0C80000–0C9FFFF | 0640000–064FFFF |
| SA101 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 0CA0000–0CBFFFF | 0650000–065FFFF |
| SA102 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 0CC0000–0CDFFFF | 0660000–066FFFF |
| SA103 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 0CE0000–0CFFFFF | 0670000–067FFFF |
| SA104 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0D00000–0D1FFFF | 0680000–068FFFF |
| SA105 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0D20000–0D3FFFF | 0690000–069FFFF |
| SA106 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0D40000–0D5FFFF | 06A0000–06AFFFF |
| SA107 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0D60000–0D7FFFF | 06B0000–06BFFFF |
| SA108 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0D80000–0D9FFFF | 06C0000–06CFFFF |
| SA109 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 0DA0000–0DBFFFF | 06D0000–06DFFFF |
| SA110 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 0DC0000–0DDFFFF | 06E0000–06EFFFF |
| SA111 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 0DE0000–0DFFFFF | 06F0000–06FFFFFF |
| SA112 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0E00000–0E1FFFF | 0700000–070FFFF |
| SA113 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0E20000–0E3FFFF | 0710000–071FFFF |
| SA114 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0E40000–0E5FFFF | 0720000–072FFFF |
| SA115 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0E60000–0E7FFFF | 0730000–073FFFF |
| SA116 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0E80000–0E9FFFF | 0740000–074FFFF |
| SA117 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 0EA0000–0EBFFFF | 0750000–075FFFF |
| SA118 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 0EC0000–0EDFFFF | 0760000–076FFFF |
| SA119 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 0EE0000–0EFFFFFF | 0770000–077FFFF |
| SA120 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0F00000–0F1FFFF | 0780000–078FFFF |
| SA121 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0F20000–0F3FFFF | 0790000–079FFFF |
| SA122 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0F40000–0F5FFFF | 07A0000–07AFFFF |
| SA123 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0F60000–0F7FFFF | 07B0000–07BFFFF |
| SA124 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0F80000–0F9FFFF | 07C0000–07CFFFF |
| SA125 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 0FA0000–0FBFFFF | 07D0000–07DFFFF |
| SA126 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 0FC0000–0FDFFFF | 07E0000–07EFFFF |
| SA127 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 0FE0000–0FFFFFF | 07F0000–07FFFFFF |
| SA128 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1000000–101FFFF | 0800000–080FFFF |
| SA129 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1020000–103FFFF | 0810000–081FFFF |
| SA130 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1040000–105FFFF | 0820000–082FFFF |

Table 3. Sector Address Table–S29GL256N (Sheet 4 of 6)

| Sector | A23–A16 | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | | |
| SA131 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1060000–107FFFF | 0830000–083FFFF |
| SA132 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1080000–109FFFF | 0840000–084FFFF |
| SA133 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 10A0000–10BFFFF | 0850000–085FFFF |
| SA134 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 10C0000–10DFFFF | 0860000–086FFFF |
| SA135 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 10E0000–10FFFFFF | 0870000–087FFFF |
| SA136 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1100000–111FFFF | 0880000–088FFFF |
| SA137 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1120000–113FFFF | 0890000–089FFFF |
| SA138 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1140000–115FFFF | 08A0000–08AFFFF |
| SA139 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1160000–117FFFF | 08B0000–08BFFFF |
| SA140 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1180000–119FFFF | 08C0000–08CFFFF |
| SA141 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 11A0000–11BFFFF | 08D0000–08DFFFF |
| SA142 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 11C0000–11DFFFF | 08E0000–08EFFFF |
| SA143 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 11E0000–11FFFFFF | 08F0000–08FFFFFF |
| SA144 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 1200000–121FFFF | 0900000–090FFFF |
| SA145 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1220000–123FFFF | 0910000–091FFFF |
| SA146 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1240000–125FFFF | 0920000–092FFFF |
| SA147 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1260000–127FFFF | 0930000–093FFFF |
| SA148 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1280000–129FFFF | 0940000–094FFFF |
| SA149 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 12A0000–12BFFFF | 0950000–095FFFF |
| SA150 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 12C0000–12DFFFF | 0960000–096FFFF |
| SA151 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 12E0000–12FFFFFF | 0970000–097FFFF |
| SA152 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1300000–131FFFF | 0980000–098FFFF |
| SA153 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1320000–133FFFF | 0990000–099FFFF |
| SA154 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1340000–135FFFF | 09A0000–09AFFFF |
| SA155 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1360000–137FFFF | 09B0000–09BFFFF |
| SA156 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1380000–139FFFF | 09C0000–09CFFFF |
| SA157 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 13A0000–13BFFFF | 09D0000–09DFFFF |
| SA158 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 13C0000–13DFFFF | 09E0000–09EFFFF |
| SA159 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 13E0000–13FFFFFF | 09F0000–09FFFFFF |
| SA160 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1400000–141FFFF | 0A00000–0A0FFFF |
| SA161 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1420000–143FFFF | 0A10000–0A1FFFF |
| SA162 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1440000–145FFFF | 0A20000–0A2FFFF |
| SA163 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1460000–147FFFF | 0A30000–0A3FFFF |
| SA164 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1480000–149FFFF | 0A40000–0A4FFFF |
| SA165 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 14A0000–14BFFFF | 0A50000–0A5FFFF |
| SA166 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 14C0000–14DFFFF | 0A60000–0A6FFFF |
| SA167 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 14E0000–14FFFFFF | 0A70000–0A7FFFF |
| SA168 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1500000–151FFFF | 0A80000–0A8FFFF |
| SA169 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1520000–153FFFF | 0A90000–0A9FFFF |
| SA170 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1540000–155FFFF | 0AA0000–0AAFFFF |
| SA171 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1560000–157FFFF | 0AB0000–0ABFFFF |
| SA172 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1580000–159FFFF | 0AC0000–0ACFFFF |
| SA173 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 15A0000–15BFFFF | 0AD0000–0ADFFFF |
| SA174 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 15C0000–15DFFFF | 0AE0000–0AEFFFF |

Table 3. Sector Address Table–S29GL256N (Sheet 5 of 6)

| Sector | A23–A16 | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|--------------------------------|--|---|
| | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | | | |
| SA175 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 15E0000–15FFFFFF | 0AF0000–0AFFFFF |
| SA176 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 1600000–161FFFF | 0B00000–0B0FFFF |
| SA177 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1620000–163FFFF | 0B10000–0B1FFFF |
| SA178 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1640000–165FFFF | 0B20000–0B2FFFF |
| SA179 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1660000–167FFFF | 0B30000–0B3FFFF |
| SA180 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1680000–169FFFF | 0B40000–0B4FFFF |
| SA181 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 16A0000–16BFFFF | 0B50000–0B5FFFF |
| SA182 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 16C0000–16DFFFF | 0B60000–0B6FFFF |
| SA183 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 16E0000–16FFFFFF | 0B70000–0B7FFFF |
| SA184 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1700000–171FFFF | 0B80000–0B8FFFF |
| SA185 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1720000–173FFFF | 0B90000–0B9FFFF |
| SA186 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1740000–175FFFF | 0BA0000–0BAFFFF |
| SA187 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1760000–177FFFF | 0BB0000–0BBFFFF |
| SA188 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1780000–179FFFF | 0BC0000–0BCFFFF |
| SA189 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 17A0000–17BFFFF | 0BD0000–0BDFFFF |
| SA190 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 17C0000–17DFFFF | 0BE0000–0BEFFFF |
| SA191 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 17E0000–17FFFFFF | 0BF0000–0BFFFFF |
| SA192 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1800000–181FFFF | 0C00000–0C0FFFF |
| SA193 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1820000–183FFFF | 0C10000–0C1FFFF |
| SA194 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1840000–185FFFF | 0C20000–0C2FFFF |
| SA195 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1860000–187FFFF | 0C30000–0C3FFFF |
| SA196 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1880000–189FFFF | 0C40000–0C4FFFF |
| SA197 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 18A0000–18BFFFF | 0C50000–0C5FFFF |
| SA198 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 18C0000–18DFFFF | 0C60000–0C6FFFF |
| SA199 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 18E0000–18FFFFFF | 0C70000–0C7FFFF |
| SA200 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1900000–191FFFF | 0C80000–0C8FFFF |
| SA201 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1920000–193FFFF | 0C90000–0C9FFFF |
| SA202 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1940000–195FFFF | 0CA0000–0CAFFFF |
| SA203 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1960000–197FFFF | 0CB0000–0CBFFFF |
| SA204 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1980000–199FFFF | 0CC0000–0CCFFFF |
| SA205 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 19A0000–19BFFFF | 0CD0000–0CDFFFF |
| SA206 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 19C0000–19DFFFF | 0CE0000–0CEFFFF |
| SA207 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 19E0000–19FFFF | 0CF0000–0CFFFFFF |
| SA208 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 1A00000–1A1FFFF | 0D00000–0D0FFFF |
| SA209 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1A20000–1A3FFFF | 0D10000–0D1FFFF |
| SA210 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1A40000–1A5FFFF | 0D20000–0D2FFFF |
| SA211 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1A60000–1A7FFFF | 0D30000–0D3FFFF |
| SA212 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1A80000–1A9FFFF | 0D40000–0D4FFFF |
| SA213 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 1AA0000–1ABFFFF | 0D50000–0D5FFFF |
| SA214 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 1AC0000–1ADFFFF | 0D60000–0D6FFFF |
| SA215 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 1AE0000–1AFFFFF | 0D70000–0D7FFFF |
| SA216 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1B00000–1B1FFFF | 0D80000–0D8FFFF |
| SA217 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1B20000–1B3FFFF | 0D90000–0D9FFFF |
| SA218 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1B40000–1B5FFFF | 0DA0000–0DAFFFF |

Table 3. Sector Address Table–S29GL256N (Sheet 6 of 6)

| Sector | A23–A16 | | | | | | | | Sector Size (Kbytes/Kwords) | 8-bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|---|--------------------------------|--|---|
| | | | | | | | | | | | |
| SA219 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1B60000–1B7FFFF | 0DB0000–0DBFFFF |
| SA220 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1B80000–1B9FFFF | 0DC0000–0DCFFFF |
| SA221 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 1BA0000–1BBFFFF | 0DD0000–0DDFFFF |
| SA222 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 1BC0000–1BDFFFF | 0DE0000–0DEFFFF |
| SA223 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 1BE0000–1BFFFFF | 0DF0000–0DFFFFF |
| SA224 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 1C00000–1C1FFFF | 0E00000–0E0FFFF |
| SA225 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 1C20000–1C3FFFF | 0E10000–0E1FFFF |
| SA226 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 1C40000–1C5FFFF | 0E20000–0E2FFFF |
| SA227 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 1C60000–1C7FFFF | 0E30000–0E3FFFF |
| SA228 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 1C80000–1C9FFFF | 0E40000–0E4FFFF |
| SA229 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 1CA0000–1CBFFFF | 0E50000–0E5FFFF |
| SA230 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 1CC0000–1CDFFFF | 0E60000–0E6FFFF |
| SA231 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 1CE0000–1CFFFFF | 0E70000–0E7FFFF |
| SA232 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 1D00000–1D1FFFF | 0E80000–0E8FFFF |
| SA233 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 1D20000–1D3FFFF | 0E90000–0E9FFFF |
| SA234 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 1D40000–1D5FFFF | 0EA0000–0EAFFFF |
| SA235 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 1D60000–1D7FFFF | 0EB0000–0EBFFFF |
| SA236 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 1D80000–1D9FFFF | 0EC0000–0ECFFFF |
| SA237 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 1DA0000–1DBFFFF | 0ED0000–0EDFFFF |
| SA238 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 1DC0000–1DDFFFF | 0EE0000–0EEFFFF |
| SA239 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 1DE0000–1DFFFFF | 0EF0000–0EFFFFF |
| SA240 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 1E00000–1E1FFFF | 0F00000–0F0FFFF |
| SA241 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 1E20000–1E3FFFF | 0F10000–0F1FFFF |
| SA242 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 1E40000–1E5FFFF | 0F20000–0F2FFFF |
| SA243 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 1E60000–137FFFF | 0F30000–0F3FFFF |
| SA244 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 1E80000–1E9FFFF | 0F40000–0F4FFFF |
| SA245 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 1EA0000–1EBFFFF | 0F50000–0F5FFFF |
| SA246 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 1EC0000–1EDFFFF | 0F60000–0F6FFFF |
| SA247 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 1EE0000–1EFFFFF | 0F70000–0F7FFFF |
| SA248 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 1F00000–1F1FFFF | 0F80000–0F8FFFF |
| SA249 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 1F20000–1F3FFFF | 0F90000–0F9FFFF |
| SA250 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 1F40000–1F5FFFF | 0FA0000–0FAFFFF |
| SA251 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 1F60000–1F7FFFF | 0FB0000–0FBFFFF |
| SA252 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 1F80000–1F9FFFF | 0FC0000–0FCFFFF |
| SA253 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 1FA0000–1FBFFFF | 0FD0000–0FDFFFF |
| SA254 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 1FC0000–1FDFFFF | 0FE0000–0FEFFFF |
| SA255 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 1FE0000–1FFFFFF | 0FF0000–0FFFFFF |

Table 4. Sector Address Table–S29GLI28N (Sheet I of 3)

| Sector | A22–A16 | | | | | | | Sector Size (Kbytes/Kwords) | 8-Bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|--------------------------------|--|---|
| | | | | | | | | | | |
| SA0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0000000–001FFFF | 0000000–000FFFF |
| SA1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0020000–003FFFF | 0010000–001FFFF |
| SA2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0040000–005FFFF | 0020000–002FFFF |
| SA3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0060000–007FFFF | 0030000–003FFFF |
| SA4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0080000–009FFFF | 0040000–004FFFF |
| SA5 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 00A0000–00BFFFF | 0050000–005FFFF |
| SA6 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 00C0000–00DFFFF | 0060000–006FFFF |
| SA7 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 00E0000–00FFFFFF | 0070000–007FFFF |
| SA8 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0100000–011FFFF | 0080000–008FFFF |
| SA9 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0120000–013FFFF | 0090000–009FFFF |
| SA10 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0140000–015FFFF | 00A0000–00AFFFF |
| SA11 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0160000–017FFFF | 00B0000–00BFFFF |
| SA12 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0180000–019FFFF | 00C0000–00CFFFF |
| SA13 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 01A0000–01BFFFF | 00D0000–00DFFFF |
| SA14 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 01C0000–01DFFFF | 00E0000–00EFFFF |
| SA15 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 01E0000–01FFFFFF | 00F0000–00FFFFFF |
| SA16 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0200000–021FFFF | 0100000–010FFFF |
| SA17 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0220000–023FFFF | 0110000–011FFFF |
| SA18 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0240000–025FFFF | 0120000–012FFFF |
| SA19 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0260000–027FFFF | 0130000–013FFFF |
| SA20 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0280000–029FFFF | 0140000–014FFFF |
| SA21 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 02A0000–02BFFFF | 0150000–015FFFF |
| SA22 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 02C0000–02DFFFF | 0160000–016FFFF |
| SA23 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 02E0000–02FFFFFF | 0170000–017FFFF |
| SA24 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0300000–031FFFF | 0180000–018FFFF |
| SA25 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0320000–033FFFF | 0190000–019FFFF |
| SA26 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0340000–035FFFF | 01A0000–01AFFFF |
| SA27 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0360000–037FFFF | 01B0000–01BFFFF |
| SA28 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0380000–039FFFF | 01C0000–01CFFFF |
| SA29 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 03A0000–03BFFFF | 01D0000–01DFFFF |
| SA30 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 03C0000–03DFFFF | 01E0000–01EFFFF |
| SA31 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 03E0000–03FFFFFF | 01F0000–01FFFFFF |
| SA32 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0400000–041FFFF | 0200000–020FFFF |
| SA33 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0420000–043FFFF | 0210000–021FFFF |
| SA34 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0440000–045FFFF | 0220000–022FFFF |
| SA35 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0460000–047FFFF | 0230000–023FFFF |
| SA36 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0480000–049FFFF | 0240000–024FFFF |
| SA37 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 04A0000–04BFFFF | 0250000–025FFFF |
| SA38 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 04C0000–04DFFFF | 0260000–026FFFF |
| SA39 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 04E0000–04FFFFFF | 0270000–027FFFF |
| SA40 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0500000–051FFFF | 0280000–028FFFF |
| SA41 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0520000–053FFFF | 0290000–029FFFF |
| SA42 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0540000–055FFFF | 02A0000–02AFFFF |

Table 4. Sector Address Table–S29GLI28N (Sheet 2 of 3)

| Sector | A22–A16 | | | | | | | Sector Size (Kbytes/Kwords) | 8-Bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|---|---|---|---|---|---|--------------------------------|--|---|
| | 0 | 1 | 0 | 1 | 0 | 1 | 1 | | | |
| SA43 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0560000–057FFFF | 02B0000–02BFFFF |
| SA44 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0580000–059FFFF | 02C0000–02CFFFF |
| SA45 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 05A0000–05BFFFF | 02D0000–02DFFFF |
| SA46 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 05C0000–05DFFFF | 02E0000–02EFFFF |
| SA47 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 05E0000–05FFFFFF | 02F0000–02FFFFFF |
| SA48 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0600000–061FFFF | 0300000–030FFFF |
| SA49 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0620000–063FFFF | 0310000–031FFFF |
| SA50 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0640000–065FFFF | 0320000–032FFFF |
| SA51 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0660000–067FFFF | 0330000–033FFFF |
| SA52 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0680000–069FFFF | 0340000–034FFFF |
| SA53 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 06A0000–06BFFFF | 0350000–035FFFF |
| SA54 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 06C0000–06DFFFF | 0360000–036FFFF |
| SA55 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 06E0000–06FFFFFF | 0370000–037FFFF |
| SA56 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0700000–071FFFF | 0380000–038FFFF |
| SA57 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0720000–073FFFF | 0390000–039FFFF |
| SA58 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0740000–075FFFF | 03A0000–03AFFFF |
| SA59 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0760000–077FFFF | 03B0000–03BFFFF |
| SA60 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0780000–079FFFF | 03C0000–03CFFFF |
| SA61 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 07A0000–07BFFFF | 03D0000–03DFFFF |
| SA62 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 07C0000–07DFFFF | 03E0000–03EFFFF |
| SA63 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 07E0000–07FFFFFF | 03F0000–03FFFFFF |
| SA64 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0800000–081FFFF | 0400000–040FFFF |
| SA65 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0820000–083FFFF | 0410000–041FFFF |
| SA66 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0840000–085FFFF | 0420000–042FFFF |
| SA67 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0860000–087FFFF | 0430000–043FFFF |
| SA68 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0880000–089FFFF | 0440000–044FFFF |
| SA69 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 128/64 | 08A0000–08BFFFF | 0450000–045FFFF |
| SA70 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 128/64 | 08C0000–08DFFFF | 0460000–046FFFF |
| SA71 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 128/64 | 08E0000–08FFFFFF | 0470000–047FFFF |
| SA72 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0900000–091FFFF | 0480000–048FFFF |
| SA73 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0920000–093FFFF | 0490000–049FFFF |
| SA74 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0940000–095FFFF | 04A0000–04AFFFF |
| SA75 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0960000–097FFFF | 04B0000–04BFFFF |
| SA76 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0980000–099FFFF | 04C0000–04CFFFF |
| SA77 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 128/64 | 09A0000–09BFFFF | 04D0000–04DFFFF |
| SA78 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 128/64 | 09C0000–09DFFFF | 04E0000–04EFFFF |
| SA79 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 128/64 | 09E0000–09FFFFFF | 04F0000–04FFFFFF |
| SA80 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0A00000–0A1FFFF | 0500000–050FFFF |
| SA81 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0A20000–0A3FFFF | 0510000–051FFFF |
| SA82 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0A40000–0A5FFFF | 0520000–052FFFF |
| SA83 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0A60000–0A7FFFF | 0530000–053FFFF |
| SA84 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0A80000–0A9FFFF | 0540000–054FFFF |
| SA85 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 128/64 | 0AA0000–0ABFFFF | 0550000–055FFFF |
| SA86 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 128/64 | 0AC0000–0ADFFFF | 0560000–056FFFF |

Table 4. Sector Address Table–S29GLI28N (Sheet 3 of 3)

| Sector | A22–A16 | | | | | | | Sector Size (Kbytes/Kwords) | 8-Bit Address Range (in hexadecimal) | 16-bit Address Range (in hexadecimal) |
|--------|---------|-----|-----|-----|-----|-----|-----|--------------------------------|--|---|
| | A22 | A21 | A20 | A19 | A18 | A17 | A16 | | | |
| SA87 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 128/64 | 0AE0000–0AFFFFF | 0570000–057FFFF |
| SA88 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0B00000–0B1FFFF | 0580000–058FFFF |
| SA89 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0B20000–0B3FFFF | 0590000–059FFFF |
| SA90 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0B40000–0B5FFFF | 05A0000–05AFFFF |
| SA91 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0B60000–0B7FFFF | 05B0000–05BFFFF |
| SA92 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0B80000–0B9FFFF | 05C0000–05CFFFF |
| SA93 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 128/64 | 0BA0000–0BBFFFF | 05D0000–05DFFFF |
| SA94 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 128/64 | 0BC0000–0BDFFFF | 05E0000–05EFFFF |
| SA95 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 128/64 | 0BE0000–0BFFFFF | 05F0000–05FFFFF |
| SA96 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 128/64 | 0C00000–0C1FFFF | 0600000–060FFFF |
| SA97 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 128/64 | 0C20000–0C3FFFF | 0610000–061FFFF |
| SA98 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 128/64 | 0C40000–0C5FFFF | 0620000–062FFFF |
| SA99 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 128/64 | 0C60000–0C7FFFF | 0630000–063FFFF |
| SA100 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 128/64 | 0C80000–0C9FFFF | 0640000–064FFFF |
| SA101 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 128/64 | 0CA0000–0CBFFFF | 0650000–065FFFF |
| SA102 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 128/64 | 0CC0000–0CDFFFF | 0660000–066FFFF |
| SA103 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 128/64 | 0CE0000–0CFFFFF | 0670000–067FFFF |
| SA104 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 128/64 | 0D00000–0D1FFFF | 0680000–068FFFF |
| SA105 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 128/64 | 0D20000–0D3FFFF | 0690000–069FFFF |
| SA106 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 128/64 | 0D40000–0D5FFFF | 06A0000–06AFFFF |
| SA107 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 128/64 | 0D60000–0D7FFFF | 06B0000–06BFFFF |
| SA108 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 128/64 | 0D80000–0D9FFFF | 06C0000–06CFFFF |
| SA109 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 128/64 | 0DA0000–0DBFFFF | 06D0000–06DFFFF |
| SA110 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 128/64 | 0DC0000–0DDFFFF | 06E0000–06EFFFF |
| SA111 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 128/64 | 0DE0000–0DFFFFF | 06F0000–06FFFFF |
| SA112 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 128/64 | 0E00000–0E1FFFF | 0700000–070FFFF |
| SA113 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 128/64 | 0E20000–0E3FFFF | 0710000–071FFFF |
| SA114 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 128/64 | 0E40000–0E5FFFF | 0720000–072FFFF |
| SA115 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 128/64 | 0E60000–0E7FFFF | 0730000–073FFFF |
| SA116 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 128/64 | 0E80000–0E9FFFF | 0740000–074FFFF |
| SA117 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 128/64 | 0EA0000–0EBFFFF | 0750000–075FFFF |
| SA118 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 128/64 | 0EC0000–0EDFFFF | 0760000–076FFFF |
| SA119 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 128/64 | 0EE0000–0EFFFFF | 0770000–077FFFF |
| SA120 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 128/64 | 0F00000–0F1FFFF | 0780000–078FFFF |
| SA121 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 128/64 | 0F20000–0F3FFFF | 0790000–079FFFF |
| SA122 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 128/64 | 0F40000–0F5FFFF | 07A0000–07AFFFF |
| SA123 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 128/64 | 0F60000–0F7FFFF | 07B0000–07BFFFF |
| SA124 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 128/64 | 0F80000–0F9FFFF | 07C0000–07CFFFF |
| SA125 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 128/64 | 0FA0000–0FBFFFF | 07D0000–07DFFFF |
| SA126 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 128/64 | 0FC0000–0FDFFFF | 07E0000–07EFFFF |
| SA127 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 128/64 | 0FE0000–0FFFFFF | 07F0000–07FFFFF |

Autoselect Mode

The autoselect mode provides manufacturer and device identification, and sector group protection verification, through identifier codes output on DQ7–DQ0. This mode is primarily intended for programming equipment to automatically match a device to be programmed with its corresponding programming algorithm. However, the autoselect codes can also be accessed in-system through the command register.

When using programming equipment, the autoselect mode requires VID on address pin A9. Address pins A6, A3, A2, A1, and A0 must be as shown in [Table 5 on page 37](#). In addition, when verifying sector protection, the sector address must appear on the appropriate highest order address bits (see [Table 2 on page 16](#)). [Table 5 on page 37](#) shows the remaining address bits that are don't care. When all necessary bits have been set as required, the programming equipment may then read the corresponding identifier code on DQ7–DQ0.

To access the autoselect codes in-system, the host system can issue the autoselect command via the command register, as shown in [Table 12 on page 63](#) and [Table 14 on page 65](#). This method does not require VID. Refer to the [“Autoselect Command Sequence” section on page 51](#) for more information.

Table 5. Autoselect Codes (High Voltage Method)

| Description | CE# | OE# | WE# | A22 to A15 | A14 to A10 | A9 | A8 to A7 | A6 | A5 to A4 | A3 to A2 | A1 | A0 | DQ8 to DQ15 | | DQ7 to DQ0 |
|---|-----|-----|-----|------------|------------|-----|----------|----|----------|----------|----|----|-------------|-------------|--|
| | | | | | | | | | | | | | BYTE# = VIH | BYTE# = VIL | |
| Manufacturer ID: Spansion Product | L | L | H | X | X | VID | X | L | X | L | L | L | 00 | X | 01h |
| Device ID S29GL12N | L | L | H | X | X | VID | X | L | X | L | L | H | 22 | X | 7Eh |
| | | | | | | | | | | H | H | L | 22 | X | 23h |
| | | | | | | | | | | H | H | H | 22 | X | 01h |
| Device ID S29GL256N | L | L | H | X | X | VID | X | L | X | L | L | H | 22 | X | 7Eh |
| | | | | | | | | | | H | H | L | 22 | X | 22h |
| | | | | | | | | | | H | H | H | 22 | X | 01h |
| Device ID S29GL128N | L | L | H | X | X | VID | X | L | X | L | L | H | 22 | X | 7Eh |
| | | | | | | | | | | H | H | L | 22 | X | 21h |
| | | | | | | | | | | H | H | H | 22 | X | 01h |
| Sector Group Protection Verification | L | L | H | SA | X | VID | X | L | X | L | H | L | X | X | 01h (protected), 00h (unprotected) |
| Secured Silicon Sector Indicator Bit (DQ7), WP# protects highest address sector | L | L | H | X | X | VID | X | L | X | L | H | H | X | X | 98h (factory locked), 18h (not factory locked) |
| Secured Silicon Sector Indicator Bit (DQ7), WP# protects lowest address sector | L | L | H | X | X | VID | X | L | X | L | H | H | X | X | 88h (factory locked), 08h (not factory locked) |

Legend: L = Logic Low = V_{IL}, H = Logic High = V_{IH}, SA = Sector Address, X = Don't care.

Sector Protection

The device features several levels of sector protection, which can disable both the program and erase operations in certain sectors or sector groups:

Persistent Sector Protection

A command sector protection method that replaces the old 12 V controlled protection method.

Password Sector Protection

A highly sophisticated protection method that requires a password before changes to certain sectors or sector groups are permitted.

WP# Hardware Protection

A write protect pin that can prevent program or erase operations in the outermost sectors.

The WP# Hardware Protection feature is always available, independent of the software managed protection method chosen.

Selecting a Sector Protection Mode

All parts default to operate in the Persistent Sector Protection mode. The customer must then choose if the Persistent or Password Protection method is most desirable. There are two one-time programmable non-volatile bits that define which sector protection method is used. If the customer decides to continue using the Persistent Sector Protection method, they must set the **Persistent Sector Protection Mode Locking Bit**. This permanently sets the part to operate only using Persistent Sector Protection. If the customer decides to use the password method, they must set the **Password Mode Locking Bit**. This permanently sets the part to operate only using password sector protection.

It is important to remember that setting either the **Persistent Sector Protection Mode Locking Bit** or the **Password Mode Locking Bit** permanently selects the protection mode. It is not possible to switch between the two methods once a locking bit is set. **It is important that one mode is explicitly selected when the device is first programmed, rather than relying on the default mode alone.** This is so that it is not possible for a system program or virus to later set the Password Mode Locking Bit, which would cause an unexpected shift from the default Persistent Sector Protection Mode into the Password Protection Mode.

The device is shipped with all sectors unprotected. The factory offers the option of programming and protecting sectors at the factory prior to shipping the device through the ExpressFlash™ Service. Contact your sales representative for details.

It is possible to determine whether a sector is protected or unprotected. See [Autoselect Command Sequence, on page 51](#) for details.

Advanced Sector Protection

Advanced Sector Protection features several levels of sector protection, which can disable both the program and erase operations in certain sectors.

Persistent Sector Protection is a method that replaces the old 12V controlled protection method.

Password Sector Protection is a highly sophisticated protection method that requires a password before changes to certain sectors are permitted.

Lock Register

The Lock Register consists of 3 bits (DQ2, DQ1, and DQ0). These DQ2, DQ1, DQ0 bits of the Lock Register are programmable by the user. Users are not allowed to program both DQ2 and DQ1 bits of the Lock Register to the 00 state. If the user tries to program DQ2 and DQ1 bits of the Lock Register to the 00 state, the device aborts the Lock Register back to the default 11 state. The programming time of the Lock Register is same as the typical word programming time without utilizing the Write Buffer of the device. During a Lock Register programming sequence execution, the DQ6 Toggle Bit I toggles until the programming of the Lock Register has completed to indicate programming status. All Lock Register bits are readable to allow users to verify Lock Register statuses.

The Customer Secured Silicon Sector Protection Bit is DQ0, Persistent Protection Mode Lock Bit is DQ1, and Password Protection Mode Lock Bit is DQ2 are accessible by all users. Each of these bits are non-volatile. DQ15-DQ3 are reserved and must be 1's when the user tries to program the DQ2, DQ1, and DQ0 bits of the Lock Register. The user is not required to program DQ2, DQ1 and DQ0 bits of the Lock Register at the same time. This allows users to lock the Secured Silicon Sector and then set the device either permanently into Password Protection Mode or Persistent Protection Mode and then lock the Secured Silicon Sector at separate instances and time frames.

- Secured Silicon Sector Protection allows the user to lock the Secured Silicon Sector area
- Persistent Protection Mode Lock Bit allows the user to set the device permanently to operate in the Persistent Protection Mode
- Password Protection Mode Lock Bit allows the user to set the device permanently to operate in the Password Protection Mode

Table 6. Lock Register

| DQ15-3 | DQ2 | DQ1 | DQ0 |
|------------|-----------------------------------|-------------------------------------|---------------------------------------|
| Don't Care | Password Protection Mode Lock Bit | Persistent Protection Mode Lock Bit | Secured Silicon Sector Protection Bit |

Persistent Sector Protection

The Persistent Sector Protection method replaces the old 12 V controlled protection method while at the same time enhancing flexibility by providing three different sector protection states:

- **Dynamically Locked**-The sector is protected and can be changed by a simple command
- **Persistently Locked**-A sector is protected and cannot be changed
- **Unlocked**-The sector is unprotected and can be changed by a simple command

In order to achieve these states, three types of "bits" are going to be used:

Dynamic Protection Bit (DYB)

A volatile protection bit is assigned for each sector. After power-up or hardware reset, the contents of all DYB bits are in the "unprotected state". Each DYB is individually modifiable through the DYB Set Command and DYB Clear Command. When the parts are first shipped, all of the Persistent Protect Bits (PPB) are cleared into the unprotected state. The DYB bits and PPB Lock bit are defaulted to power up in the cleared state or unprotected state - meaning the all PPB bits are changeable.

The Protection State for each sector is determined by the logical OR of the PPB and the DYB related to that sector. For the sectors that have the PPB bits cleared, the DYB bits control whether or not the sector is protected or unprotected. By issuing the DYB Set and DYB Clear command sequences, the DYB bits is protected or unprotected, thus placing each sector in the protected or unprotected state. These are the so-called Dynamic Locked or Unlocked

states. They are called dynamic states because it is very easy to switch back and forth between the protected and un-protected conditions. This allows software to easily protect sectors against inadvertent changes yet does not prevent the easy removal of protection when changes are needed.

The DYB bits maybe set or cleared as often as needed. The PPB bits allow for a more static, and difficult to change, level of protection. The PPB bits retain their state across power cycles because they are Non-Volatile. Individual PPB bits are set with a program command but must all be cleared as a group through an erase command.

The PPB Lock Bit adds an additional level of protection. Once all PPB bits are programmed to the desired settings, the PPB Lock Bit may be set to the “freeze state”. Setting the PPB Lock Bit to the “freeze state” disables all program and erase commands to the Non-Volatile PPB bits. In effect, the PPB Lock Bit locks the PPB bits into their current state. The only way to clear the PPB Lock Bit to the “unfreeze state” is to go through a power cycle, or hardware reset. The Software Reset command does not clear the PPB Lock Bit to the “unfreeze state”. System boot code can determine if any changes to the PPB bits are needed e.g. to allow new system code to be downloaded. If no changes are needed then the boot code can set the PPB Lock Bit to disable any further changes to the PPB bits during system operation.

The WP# write protect pin adds a final level of hardware protection. When this pin is low it is not possible to change the contents of the WP# protected sectors. These sectors generally hold system boot code. So, the WP# pin can prevent any changes to the boot code that could override the choices made while setting up sector protection during system initialization.

It is possible to have sectors that have been persistently locked, and sectors that are left in the dynamic state. The sectors in the dynamic state are all unprotected. If there is a need to protect some of them, a simple DYB Set command sequence is all that is necessary. The DYB Set and DYB Clear commands for the dynamic sectors switch the DYB bits to signify protected and unprotected, respectively. If there is a need to change the status of the persistently locked sectors, a few more steps are required. First, the PPB Lock Bit must be disabled to the “unfreeze state” by either putting the device through a power-cycle, or hardware reset. The PPB bits can then be changed to reflect the desired settings. Setting the PPB Lock Bit once again to the “freeze state” locks the PPB bits, and the device operates normally again.

To achieve the best protection, execute the PPB Lock Bit Set command early in the boot code, and protect the boot code by holding $WP\# = V_{IL}$.

Persistent Protection Bit (PPB)

A single Persistent (non-volatile) Protection Bit is assigned to each sector. If a PPB is programmed to the protected state through the “PPB Program” command, that sector is protected from program or erase operations is read-only. If a PPB requires erasure, all of the sector PPB bits must first be erased in parallel through the “All PPB Erase” command. The “All PPB Erase” command preprograms all PPB bits prior to PPB erasing. All PPB bits erase in parallel, unlike programming where individual PPB bits are programmable. The PPB bits have the same endurance as the flash memory.

Programming the PPB bit requires the typical word programming time without utilizing the Write Buffer. During a PPB bit programming and all PPB bit erasing sequence executions, the DQ6 Toggle Bit 1 toggles until the programming of the PPB bit or erasing of all PPB bits has completed to indicate programming and erasing status. Erasing all of the PPB bits at once requires typical sector erase time. During the erasing of all PPB bits, the DQ3 Sector Erase Timer bit outputs a 1 to indicate the erasure of all PPB bits are in progress. When the erasure of all PPB bits has completed, the DQ3 Sector Erase Timer bit outputs a 0 to indicate that all PPB bits have been erased. Reading the PPB Status bit requires the initial access time of the device.

Persistent Protection Bit Lock (PPB Lock Bit)

A global volatile bit. When set to the “freeze state”, the PPB bits cannot be changed. When cleared to the “unfreeze state”, the PPB bits are changeable. There is only one PPB Lock Bit per device. The PPB Lock Bit is cleared to the “unfreeze state” after power-up or hardware reset. There is no command sequence to unlock or “unfreeze” the PPB Lock Bit.

Configuring the PPB Lock Bit to the freeze state requires approximately 100ns. Reading the PPB Lock Status bit requires the initial access time of the device.

Table 7. Sector Protection Schemes

| Protection States | | | Sector State |
|-------------------|-----------|--------------|---|
| DYB Bit | PPB Bit | PPB Lock Bit | |
| Unprotect | Unprotect | Unfreeze | Unprotected – PPB and DYB are changeable |
| Unprotect | Unprotect | Freeze | Unprotected – PPB not changeable, DYB is changeable |
| Unprotect | Protect | Unfreeze | Protected – PPB and DYB are changeable |
| Unprotect | Protect | Freeze | Protected – PPB not changeable, DYB is changeable |
| Protect | Unprotect | Unfreeze | Protected – PPB and DYB are changeable |
| Protect | Unprotect | Freeze | Protected – PPB not changeable, DYB is changeable |
| Protect | Protect | Unfreeze | Protected – PPB and DYB are changeable |
| Protect | Protect | Freeze | Protected – PPB not changeable, DYB is changeable |

Table 7 contains all possible combinations of the DYB bit, PPB bit, and PPB Lock Bit relating to the status of the sector. In summary, if the PPB bit is set, and the PPB Lock Bit is set, the sector is protected and the protection cannot be removed until the next power cycle or hardware reset clears the PPB Lock Bit to “unfreeze state”. If the PPB bit is cleared, the sector can be dynamically locked or unlocked. The DYB bit then controls whether or not the sector is protected or unprotected. If the user attempts to program or erase a protected sector, the device ignores the command and returns to read mode. A program command to a protected sector enables status polling for approximately 1 μ s before the device returns to read mode without having modified the contents of the protected sector. An erase command to a protected sector enables status polling for approximately 50 μ s after which the device returns to read mode without having erased the protected sector. The programming of the DYB bit, PPB bit, and PPB Lock Bit for a given sector can be verified by writing a DYB Status Read, PPB Status Read, and PPB Lock Status Read commands to the device.

The Autoselect Sector Protection Verification outputs the OR function of the DYB bit and PPB bit per sector basis. When the OR function of the DYB bit and PPB bit is a 1, the sector is either protected by DYB or PPB or both. When the OR function of the DYB bit and PPB bit is a 0, the sector is unprotected through both the DYB and PPB.

Persistent Protection Mode Lock Bit

Like the Password Protection Mode Lock Bit, a Persistent Protection Mode Lock Bit exists to guarantee that the device remain in software sector protection. Once programmed, the Persistent Protection Mode Lock Bit prevents programming of the Password Protection Mode Lock Bit. This guarantees that a hacker could not place the device in Password Protection Mode. The Password Protection Mode Lock Bit resides in the “Lock Register”.

Password Sector Protection

The Password Sector Protection method allows an even higher level of security than the Persistent Sector Protection method. There are two main differences between the Persistent Sector Protection and the Password Sector Protection methods:

- When the device is first powered on, or comes out of a reset cycle, the PPB Lock Bit is set to the locked state, or the freeze state, rather than cleared to the unlocked state, or the unfreeze state.
- The only means to clear and unfreeze the PPB Lock Bit is by writing a unique 64-bit Password to the device.

The Password Sector Protection method is otherwise identical to the Persistent Sector Protection method.

A 64-bit password is the only additional tool utilized in this method.

The password is stored in a one-time programmable (OTP) region outside of the flash memory. Once the Password Protection Mode Lock Bit is set, the password is permanently set with no means to read, program, or erase it. The password is used to clear and unfreeze the PPB Lock Bit. The Password Unlock command must be written to the flash, along with a password. The flash device internally compares the given password with the pre-programmed password. If they match, the PPB Lock Bit is cleared to the *unfrozen state*, and the PPB bits can be altered. If they do not match, the flash device does nothing. There is a built-in 2 μ s delay for each *password check* after the valid 64-bit password is entered for the PPB Lock Bit to be cleared to the “unfrozen state”. This delay is intended to thwart any efforts to run a program that tries all possible combinations in order to crack the password.

Password and Password Protection Mode Lock Bit

In order to select the Password Sector Protection method, the customer must first program the password. The factory recommends that the password be somehow correlated to the unique Electronic Serial Number (ESN) of the particular flash device. Each ESN is different for every flash device; therefore each password should be different for every flash device. While programming in the password region, the customer may perform Password Read operations. Once the desired password is programmed in, the customer must then set the Password Protection Mode Lock Bit. This operation achieves two objectives:

1. It permanently sets the device to operate using the Password Protection Mode. It is not possible to reverse this function.
2. It also disables all further commands to the password region. All program, and read operations are ignored.

Both of these objectives are important, and if not carefully considered, may lead to unrecoverable errors. The user must be sure that the Password Sector Protection method is desired when programming the Password Protection Mode Lock Bit. More importantly, the user must be sure that the password is correct when the Password Protection Mode Lock Bit is programmed. Due to the fact that read operations are disabled, there is no means to read what the password is afterwards. If the password is lost after programming the Password Protection Mode Lock Bit, there is no way to clear and unfreeze the PPB Lock Bit. The Password Protection Mode Lock Bit, once programmed, prevents reading the 64-bit password on the DQ bus and further password programming. The Password Protection Mode Lock Bit is not erasable. Once Password Protection Mode Lock Bit is programmed, the Persistent Protection Mode Lock Bit is disabled from programming, guaranteeing that no changes to the protection scheme are allowed.

64-bit Password

The 64-bit Password is located in its own memory space and is accessible through the use of the Password Program and Password Read commands. The password function works in conjunction with the Password Protection Mode Lock Bit, which when programmed, prevents the Password Read command from reading the contents of the password on the pins of the device.

Persistent Protection Bit Lock (PPB Lock Bit)

A global volatile bit. The PPB Lock Bit is a volatile bit that reflects the state of the Password Protection Mode Lock Bit after power-up reset. If the Password Protection Mode Lock Bit is also programmed after programming the Password, the Password Unlock command must be issued to clear and unfreeze the PPB Lock Bit after a hardware reset (RESET# asserted) or a power-up reset. Successful execution of the Password Unlock command clears and unfreezes the PPB Lock Bit, allowing for sector PPB bits to be modified. Without issuing the Password Unlock command, while asserting RESET#, taking the device through a power-on reset, or issuing the PPB Lock Bit Set command sets the PPB Lock Bit to a the “freeze state”.

If the Password Protection Mode Lock Bit is not programmed, the device defaults to Persistent Protection Mode. In the Persistent Protection Mode, the PPB Lock Bit is cleared to the *unfreeze state* after power-up or hardware reset. The PPB Lock Bit is set to the *freeze state* by issuing the PPB Lock Bit Set command. Once set to the *freeze state* the only means for clearing the PPB Lock Bit to the “unfreeze state” is by issuing a hardware or power-up reset. The Password Unlock command is ignored in Persistent Protection Mode.

Reading the PPB Lock Bit requires a 200ns access time.

Secured Silicon Sector Flash Memory Region

The Secured Silicon Sector feature provides a Flash memory region that enables permanent part identification through an Electronic Serial Number (ESN). The Secured Silicon Sector is 256 bytes in length, and uses a Secured Silicon Sector Indicator Bit (DQ7) to indicate whether or not the Secured Silicon Sector is locked when shipped from the factory. This bit is permanently set at the factory and cannot be changed, which prevents cloning of a factory locked part. This ensures the security of the ESN once the product is shipped to the field.

The factory offers the device with the Secured Silicon Sector either customer lockable (standard shipping option) or factory locked (contact an AMD sales representative for ordering information). The customer-lockable version is shipped with the Secured Silicon Sector unprotected, allowing customers to program the sector after receiving the device. The customer-lockable version also has the Secured Silicon Sector Indicator Bit permanently set to a 0. The factory-locked version is always protected when shipped from the factory, and has the Secured Silicon Sector Indicator Bit permanently set to a 1. Thus, the Secured Silicon Sector Indicator Bit prevents customer-lockable devices from being used to replace devices that are factory locked.

The Secured Silicon sector address space in this device is allocated as follows:

| Secured Silicon Sector Address Range | Customer Lockable | ESN Factory Locked | ExpressFlash Factory Locked |
|--------------------------------------|------------------------|--------------------|-------------------------------|
| 000000h–000007h | Determined by customer | ESN | ESN or determined by customer |
| 000008h–00007Fh | | Unavailable | Determined by customer |

The system accesses the Secured Silicon Sector through a command sequence (see “Write Protect (WP#)”). After the system has written the Enter Secured Silicon Sector command sequence, it may read the Secured Silicon Sector by using the addresses normally occupied by

the first sector (SA0). This mode of operation continues until the system issues the Exit Secured Silicon Sector command sequence, or until power is removed from the device. On power-up, or following a hardware reset, the device reverts to sending commands to sector SA0.

Customer Lockable: Secured Silicon Sector NOT Programmed or Protected At the Factory

Unless otherwise specified, the device is shipped such that the customer may program and protect the 256-byte Secured Silicon sector.

The system may program the Secured Silicon Sector using the write-buffer, accelerated and/or unlock bypass methods, in addition to the standard programming command sequence. See [Command Definitions, on page 50](#).

Programming and protecting the Secured Silicon Sector must be used with caution since, once protected, there is no procedure available for unprotecting the Secured Silicon Sector area and none of the bits in the Secured Silicon Sector memory space can be modified in any way.

The Secured Silicon Sector area can be protected using one of the following procedures:

- Write the three-cycle Enter Secured Silicon Sector Region command.
- To verify the protect/unprotect status of the Secured Silicon Sector, follow the algorithm. Once the Secured Silicon Sector is programmed, locked and verified, the system must write the Exit Secured Silicon Sector Region command sequence to return to reading and writing within the remainder of the array.

Factory Locked: Secured Silicon Sector Programmed and Protected At the Factory

In devices with an ESN, the Secured Silicon Sector is protected when the device is shipped from the factory. The Secured Silicon Sector cannot be modified in any way. An ESN Factory Locked device has an 16-byte random ESN at addresses 000000h–000007h. Please contact your sales representative for details on ordering ESN Factory Locked devices.

Customers may opt to have their code programmed by the factory through the ExpressFlash service (Express Flash Factory Locked). The devices are then shipped from the factory with the Secured Silicon Sector permanently locked. Contact your sales representative for details on using the ExpressFlash service.

Write Protect (WP#)

The Write Protect function provides a hardware method of protecting the first or last sector group without using V_{ID} . Write Protect is one of two functions provided by the WP#/ACC input.

If the system asserts V_{IL} on the WP#/ACC pin, the device disables program and erase functions in the first or last sector group independently of whether those sector groups were protected or unprotected using the method described in [Advanced Sector Protection, on page 38](#). Note that if WP#/ACC is at V_{IL} when the device is in the standby mode, the maximum input load current is increased. See the table in [DC Characteristics, on page 74](#).

If the system asserts V_{IH} on the WP#/ACC pin, the device reverts to whether the first or last sector was previously set to be protected or unprotected. Note that WP# has an internal pullup; when unconnected, WP# is at V_{IH} .

Hardware Data Protection

The command sequence requirement of unlock cycles for programming or erasing provides data protection against inadvertent writes (refer to [Table 12 on page 63](#) and [Table 14 on page 65](#) for command definitions). In addition, the following hardware data protection measures prevent accidental erasure or programming, which might otherwise be caused by spurious system level signals during V_{CC} power-up and power-down transitions, or from system noise.

Low V_{CC} Write Inhibit

When V_{CC} is less than V_{LKO} , the device does not accept any write cycles. This protects data during V_{CC} power-up and power-down. The command register and all internal program/erase circuits are disabled, and the device resets to the read mode. Subsequent writes are ignored until V_{CC} is greater than V_{LKO} . The system must provide the proper signals to the control pins to prevent unintentional writes when V_{CC} is greater than V_{LKO} .

Write Pulse *Glitch* Protection

Noise pulses of less than 5 ns (typical) on $OE\#$, $CE\#$ or $WE\#$ do not initiate a write cycle.

Logical Inhibit

Write cycles are inhibited by holding any one of $OE\# = V_{IL}$, $CE\# = V_{IH}$ or $WE\# = V_{IH}$. To initiate a write cycle, $CE\#$ and $WE\#$ must be a logical zero while $OE\#$ is a logical one.

Power-Up Write Inhibit

If $WE\# = CE\# = V_{IL}$ and $OE\# = V_{IH}$ during power up, the device does not accept commands on the rising edge of $WE\#$. The internal state machine is automatically reset to the read mode on power-up.

Common Flash Memory Interface (CFI)

The Common Flash Interface (CFI) specification outlines device and host system software interrogation handshake, which allows specific vendor-specified software algorithms to be used for entire families of devices. Software support can then be device-independent, JEDEC ID-independent, and forward- and backward-compatible for the specified flash device families. Flash vendors can standardize their existing interfaces for long-term compatibility.

This device enters the CFI Query mode when the system writes the CFI Query command, 98h, to address 55h, any time the device is ready to read array data. The system can read CFI information at the addresses given in [Table 8](#), [Table 9 on page 47](#), and [Table 10 on page 48](#). To terminate reading CFI data, the system must write the reset command.

The system can also write the CFI query command when the device is in the autoselect mode. The device enters the CFI query mode, and the system can read CFI data at the addresses given in [Table 8](#), [Table 9 on page 47](#), [Table 10 on page 48](#), and [Table 11 on page 49](#). The system must write the reset command to return the device to reading array data.

For further information, please refer to the CFI Specification and CFI Publication 100, available via the World Wide Web at <http://www.amd.com/flash/cfi>. Alternatively, contact your sales representative for copies of these documents.

Table 8. CFI Query Identification String

| Addresses (x16) | Addresses (x8) | Data | Description |
|-------------------|-------------------|-------------------------|--|
| 10h 11h 12h | 20h 22h 24h | 0051h 0052h 0059h | Query Unique ASCII string "QRY" |
| 13h 14h | 26h 28h | 0002h 0000h | Primary OEM Command Set |
| 15h 16h | 2Ah 2Ch | 0040h 0000h | Address for Primary Extended Table |
| 17h 18h | 2Eh 30h | 0000h 0000h | Alternate OEM Command Set (00h = none exists) |
| 19h 1Ah | 32h 34h | 0000h 0000h | Address for Alternate OEM Extended Table (00h = none exists) |

Table 9. System Interface String

| Addresses (x16) | Addresses (x8) | Data | Description |
|-----------------|----------------|-------|---|
| 1Bh | 36h | 0027h | V _{CC} Min. (write/erase) D7–D4: volt, D3–D0: 100 millivolt |
| 1Ch | 38h | 0036h | V _{CC} Max. (write/erase) D7–D4: volt, D3–D0: 100 millivolt |
| 1Dh | 3Ah | 0000h | V _{PP} Min. voltage (00h = no V _{PP} pin present) |
| 1Eh | 3Ch | 0000h | V _{PP} Max. voltage (00h = no V _{PP} pin present) |
| 1Fh | 3Eh | 0007h | Typical timeout per single byte/word write 2 ⁿ μs |
| 20h | 40h | 0007h | Typical timeout for Min. size buffer write 2 ⁿ μs (00h = not supported) |
| 21h | 42h | 000Ah | Typical timeout per individual block erase 2 ⁿ ms |
| 22h | 44h | 0000h | Typical timeout for full chip erase 2 ⁿ ms (00h = not supported) |
| 23h | 46h | 0003h | Max. timeout for byte/word write 2 ⁿ times typical |
| 24h | 48h | 0005h | Max. timeout for buffer write 2 ⁿ times typical |
| 25h | 4Ah | 0004h | Max. timeout per individual block erase 2 ⁿ times typical |
| 26h | 4Ch | 0000h | Max. timeout for full chip erase 2 ⁿ times typical (00h = not supported) |

Table 10. Device Geometry Definition

| Addresses (x16) | Addresses (x8) | Data | Description |
|--------------------------|--------------------------|----------------------------------|---|
| 27h | 4Eh | 001Ah 0019h 0018h | Device Size = 2 ^N byte 1A = 512 Mb, 19 = 256 Mb, 18 = 128 Mb |
| 28h 29h | 50h 52h | 0002h 0000h | Flash Device Interface description (refer to CFI publication 100) |
| 2Ah 2Bh | 54h 56h | 0005h 0000h | Max. number of byte in multi-byte write = 2 ^N (00h = not supported) |
| 2Ch | 58h | 0001h | Number of Erase Block Regions within device (01h = uniform device, 02h = boot device) |
| 2Dh 2Eh 2Fh 30h | 5Ah 5Ch 5Eh 60h | 00xxh 000xh 0000h 000xh | Erase Block Region 1 Information (refer to the CFI specification or CFI publication 100) 00FFh, 001h, 0000h, 0002h = 512 Mb 00FFh, 0000h, 0000h, 0002h = 256 Mb 007Fh, 0000h, 0000h, 0002h = 128 Mb |
| 31h 32h 33h 34h | 62h 64h 66h 68h | 0000h 0000h 0000h 0000h | Erase Block Region 2 Information (refer to CFI publication 100) |
| 35h 36h 37h 38h | 6Ah 6Ch 6Eh 70h | 0000h 0000h 0000h 0000h | Erase Block Region 3 Information (refer to CFI publication 100) |
| 39h 3Ah 3Bh 3Ch | 72h 74h 76h 78h | 0000h 0000h 0000h 0000h | Erase Block Region 4 Information (refer to CFI publication 100) |

Table II. Primary Vendor-Specific Extended Query

| Addresses (x16) | Addresses (x8) | Data | Description |
|-------------------|-------------------|-------------------------|---|
| 40h 41h 42h | 80h 82h 84h | 0050h 0052h 0049h | Query-unique ASCII string "PRI" |
| 43h | 86h | 0031h | Major version number, ASCII |
| 44h | 88h | 0033h | Minor version number, ASCII |
| 45h | 8Ah | 0010h | Address Sensitive Unlock (Bits 1-0) 0 = Required, 1 = Not Required Process Technology (Bits 7-2) 0100b = 110 nm MirrorBit |
| 46h | 8Ch | 0002h | Erase Suspend 0 = Not Supported, 1 = To Read Only, 2 = To Read & Write |
| 47h | 8Eh | 0001h | Sector Protect 0 = Not Supported, X = Number of sectors in per group |
| 48h | 90h | 0000h | Sector Temporary Unprotect 00 = Not Supported, 01 = Supported |
| 49h | 92h | 0008h | Sector Protect/Unprotect scheme 0008h = Advanced Sector Protection |
| 4Ah | 94h | 0000h | Simultaneous Operation 00 = Not Supported, X = Number of Sectors in Bank |
| 4Bh | 96h | 0000h | Burst Mode Type 00 = Not Supported, 01 = Supported |
| 4Ch | 98h | 0002h | Page Mode Type 00 = Not Supported, 01 = 4 Word Page, 02 = 8 Word Page |
| 4Dh | 9Ah | 00B5h | ACC (Acceleration) Supply Minimum 00h = Not Supported, D7-D4: Volt, D3-D0: 100 mV |
| 4Eh | 9Ch | 00C5h | ACC (Acceleration) Supply Maximum 00h = Not Supported, D7-D4: Volt, D3-D0: 100 mV |
| 4Fh | 9Eh | 00xxh | WP# Protection 04h = Uniform sectors bottom WP# protect, 05h = Uniform sectors top WP# protect |
| 50h | A0h | 0001h | Program Suspend 00h = Not Supported, 01h = Supported |

Command Definitions

Writing specific address and data commands or sequences into the command register initiates device operations. [Table 12 on page 63](#) and [Table 14 on page 65](#) define the valid register command sequences. *Writing incorrect address and data values or writing them in the improper sequence may place the device in an unknown state.* A reset command is then required to return the device to reading array data.

All addresses are latched on the falling edge of WE# or CE#, whichever happens later. All data is latched on the rising edge of WE# or CE#, whichever happens first. Refer to the AC Characteristics section for timing diagrams.

Reading Array Data

The device is automatically set to reading array data after device power-up. No commands are required to retrieve data. The device is ready to read array data after completing an Embedded Program or Embedded Erase algorithm.

After the device accepts an Erase Suspend command, the device enters the erase-suspend-read mode, after which the system can read data from any non-erase-suspended sector. After completing a programming operation in the Erase Suspend mode, the system may once again read array data with the same exception. See the Erase Suspend/Erased Resume Commands section for more information.

The system *must* issue the reset command to return the device to the read (or erase-suspend-read) mode if DQ5 goes high during an active program or erase operation, or if the device is in the autoselect mode. See the next section, Reset Command, for more information.

See also “[Requirements for Reading Array Data](#)” section on [page 14](#) for more information. The Read-Only Operations subsection in the “[AC Characteristics](#)” section on [page 77](#) section provides the read parameters, and [Figure 11, on page 78](#) shows the timing diagram.

Reset Command

Writing the reset command resets the device to the read or erase-suspend-read mode. Address bits are don't cares for this command.

The reset command may be written between the sequence cycles in an erase command sequence before erasing begins. This resets the device to the read mode. Once erasure begins, however, the device ignores reset commands until the operation is complete.

The reset command may be written between the sequence cycles in a program command sequence before programming begins. This resets the device to the read mode. If the program command sequence is written while the device is in the Erase Suspend mode, writing the reset command returns the device to the erase-suspend-read mode. Once programming begins, however, the device ignores reset commands until the operation is complete.

The reset command may be written between the sequence cycles in an autoselect command sequence. Once in the autoselect mode, the reset command must be written to return to the read mode. If the device entered the autoselect mode while in the Erase Suspend mode, writing the reset command returns the device to the erase-suspend-read mode.

If DQ5 goes high during a program or erase operation, writing the reset command returns the device to the read mode (or erase-suspend-read mode if the device was in Erase Suspend).

Note that if DQ1 goes high during a Write Buffer Programming operation, the system must write the Write-to-Buffer-Abort Reset command sequence to reset the device for the next operation.

Autoselect Command Sequence

The autoselect command sequence allows the host system to access the manufacturer and device codes, and determine whether or not a sector is protected. [Table 12 on page 63](#) and [Table 14 on page 65](#) show the address and data requirements. This method is an alternative to that shown in [Table 5 on page 37](#), which is intended for PROM programmers and requires V_{ID} on address pin A9. The autoselect command sequence may be written to an address that is either in the read or erase-suspend-read mode. The autoselect command may not be written while the device is actively programming or erasing.

The autoselect command sequence is initiated by first writing two unlock cycles. This is followed by a third write cycle that contains the autoselect command. The device then enters the autoselect mode. The system may read at any address any number of times without initiating another autoselect command sequence:

- A read cycle at address XX00h returns the manufacturer code.
- Three read cycles at addresses 01h, 0Eh, and 0Fh return the device code.
- A read cycle to an address containing a sector address (SA), and the address 02h on A7–A0 in word mode returns 01h if the sector is protected, or 00h if it is unprotected.

The system must write the reset command to return to the read mode (or erase-suspend-read mode if the device was previously in Erase Suspend).

Enter Secured Silicon Sector/Exit Secured Silicon Sector Command Sequence

The Secured Silicon Sector region provides a secured data area containing an 8-word/16-byte random Electronic Serial Number (ESN). The system can access the Secured Silicon Sector region by issuing the three-cycle Enter Secured Silicon Sector command sequence. The device continues to access the Secured Silicon Sector region until the system issues the four-cycle Exit Secured Silicon Sector command sequence. The Exit Secured Silicon Sector command sequence returns the device to normal operation. [Table 12 on page 63](#) shows the address and data requirements for both command sequences. See also “Secured Silicon Sector Flash Memory Region” for further information. *Note that the ACC function and unlock bypass modes are not available when the Secured Silicon Sector is enabled.*

Word Program Command Sequence

Programming is a four-bus-cycle operation. The program command sequence is initiated by writing two unlock write cycles, followed by the program set-up command. The program address and data are written next, which in turn initiate the Embedded Program algorithm. The system is *not* required to provide further controls or timings. The device automatically provides internally generated program pulses and verifies the programmed cell margin. [Table 12 on page 63](#) and [Table 14 on page 65](#) show the address and data requirements for the word program command sequence.

When the Embedded Program algorithm is complete, the device then returns to the read mode and addresses are no longer latched. The system can determine the status of the program operation by using DQ7 or DQ6. Refer to the Write Operation Status section for information on these status bits.

Any commands written to the device during the Embedded Program Algorithm are ignored. **Note that the Secured Silicon Sector, autoselect, and CFI functions are unavailable when a program operation is in progress.** Note that a **hardware reset** immediately terminates the program operation. The program command sequence should be reinitiated once the device has returned to the read mode, to ensure data integrity.

Programming is allowed in any sequence of address locations and across sector boundaries. Programming to the same word address multiple times without intervening erases (increment-

tal bit programming) is permitted. Word programming is supported for backward compatibility with existing Flash driver software and for occasional writing of individual words. Use of Write Buffer Programming is strongly recommended for general programming use when more than a few words are to be programmed. The effective word programming time using Write Buffer Programming is much shorter than the single word programming time. **Any bit cannot be programmed from 0 back to a 1.** Attempting to do so may cause the device to set DQ5 = 1, or cause the DQ7 and DQ6 status bits to indicate the operation was successful. However, a succeeding read shows that the data is still 0. Only erase operations can convert a 0 to a 1.

Unlock Bypass Command Sequence

The unlock bypass feature allows the system to program words to the device faster than using the standard program command sequence. The unlock bypass command sequence is initiated by first writing two unlock cycles. This is followed by a third write cycle containing the unlock bypass command, 20h. The device then enters the unlock bypass mode. A two-cycle unlock bypass program command sequence is all that is required to program in this mode. The first cycle in this sequence contains the unlock bypass program command, A0h; the second cycle contains the program address and data. Additional data is programmed in the same manner. This mode dispenses with the initial two unlock cycles required in the standard program command sequence, resulting in faster total programming time. [Table 12 on page 63](#) and [Table 14 on page 65](#) show the requirements for the command sequence.

During the unlock bypass mode, only the Unlock Bypass Program and Unlock Bypass Reset commands are valid. To exit the unlock bypass mode, the system must issue the two-cycle unlock bypass reset command sequence. (See [Table 12 on page 63](#) and [Table 14 on page 65](#)).

Write Buffer Programming

Write Buffer Programming allows the system write to a maximum of 16 words/32 bytes in one programming operation. This results in faster effective programming time than the standard programming algorithms. The Write Buffer Programming command sequence is initiated by first writing two unlock cycles. This is followed by a third write cycle containing the Write Buffer Load command written at the Sector Address in which programming occurs. The fourth cycle writes the sector address and the number of word locations, minus one, to be programmed. For example, if the system programs six unique address locations, then 05h should be written to the device. This tells the device how many write buffer addresses are loaded with data and therefore when to expect the Program Buffer to Flash command. The number of locations to program cannot exceed the size of the write buffer or the operation aborts.

The fifth cycle writes the first address location and data to be programmed. The write-buffer-page is selected by address bits $A_{MAX}-A_4$. All subsequent address/data pairs must fall within the selected-write-buffer-page. The system then writes the remaining address/data pairs into the write buffer. Write buffer locations may be loaded in any order.

The write-buffer-page address must be the same for all address/data pairs loaded into the write buffer. (This means Write Buffer Programming cannot be performed across multiple write-buffer pages. This also means that Write Buffer Programming cannot be performed across multiple sectors. If the system attempts to load programming data outside of the selected write-buffer page, the operation aborts.)

Note that if a Write Buffer address location is loaded multiple times, the address/data pair counter is decremented for every data load operation. The host system must therefore account for loading a write-buffer location more than once. The counter decrements for each data load operation, not for each unique write-buffer-address location. Note also that if an address location is loaded more than once into the buffer, the final data loaded for that address is programmed.

Once the specified number of write buffer locations have been loaded, the system must then write the Program Buffer to Flash command at the sector address. Any other address and data combination aborts the Write Buffer Programming operation. The device then begins programming. Data polling should be used while monitoring the last address location loaded into the write buffer. DQ7, DQ6, DQ5, and DQ1 should be monitored to determine the device status during Write Buffer Programming.

The write-buffer programming operation can be suspended using the standard program suspend/resume commands. Upon successful completion of the Write Buffer Programming operation, the device is ready to execute the next command.

The Write Buffer Programming Sequence can be aborted in the following ways:

- Load a value that is greater than the page buffer size during the Number of Locations to Program step.
- Write to an address in a sector different than the one specified during the Write-Buffer-Load command.
- Write an Address/Data pair to a different write-buffer-page than the one selected by the Starting Address during the write buffer data loading stage of the operation.
- Write data other than the Confirm Command after the specified number of data load cycles.

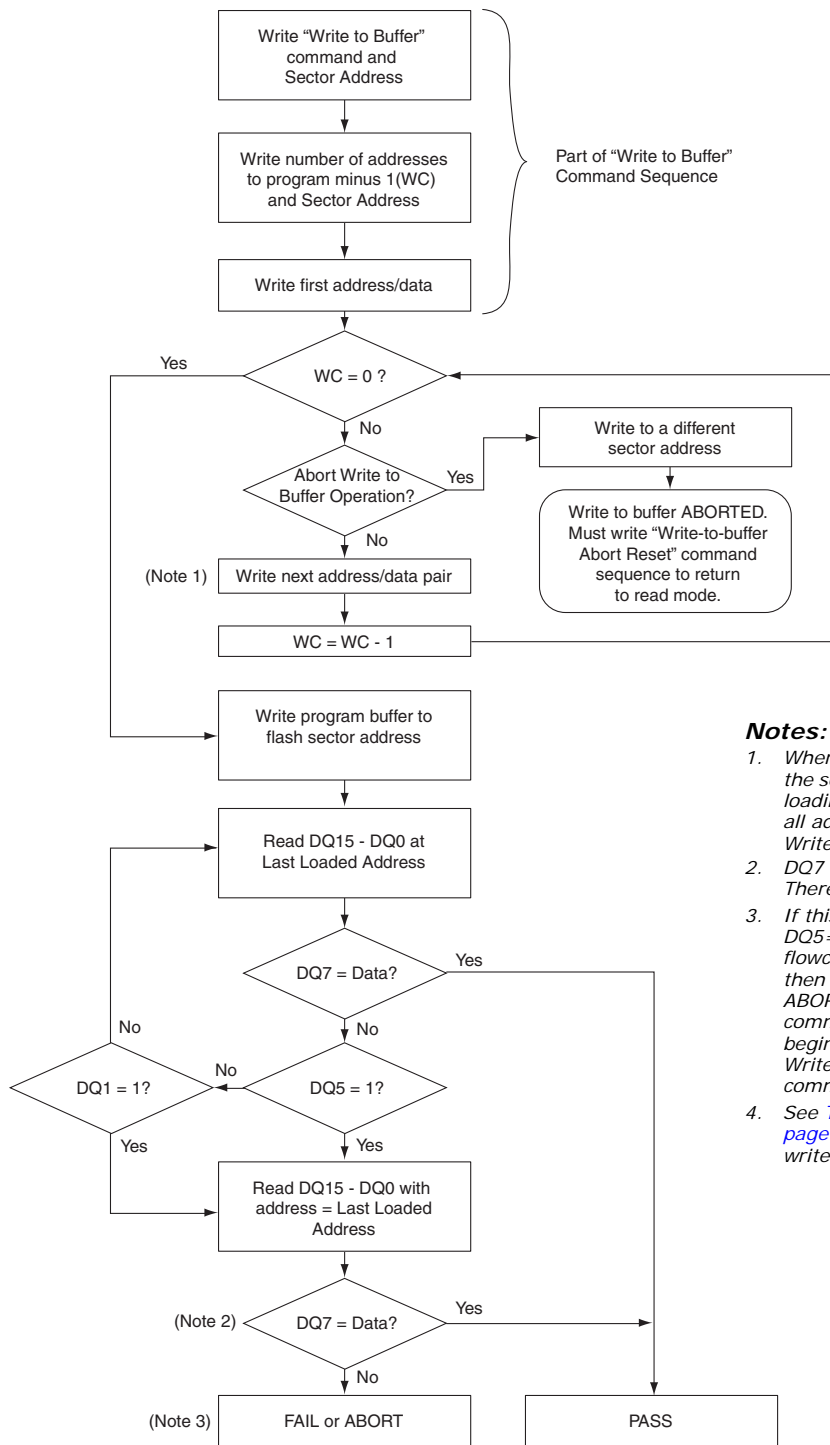
The abort condition is indicated by DQ1 = 1, DQ7 = DATA# (for the last address location loaded), DQ6 = toggle, and DQ5=0. A Write-to-Buffer-Abort Reset command sequence must be written to reset the device for the next operation.

Write buffer programming is allowed in any sequence. Note that the Secured Silicon sector, autoselect, and CFI functions are unavailable when a program operation is in progress. This flash device is capable of handling multiple write buffer programming operations on the same write buffer address range without intervening erases. **Any bit in a write buffer address range cannot be programmed from 0 back to a 1.** Attempting to do so may cause the device to set DQ5 = 1, or cause the DQ7 and DQ6 status bits to indicate the operation was successful. However, a succeeding read shows that the data is still 0. Only erase operations can convert a 0 to a 1.

Accelerated Program

The device offers accelerated program operations through the WP#/ACC pin. When the system asserts V_{HH} on the WP#/ACC pin, the device automatically enters the Unlock Bypass mode. The system may then write the two-cycle Unlock Bypass program command sequence. The device uses the higher voltage on the WP#/ACC pin to accelerate the operation. *Note that the WP#/ACC pin must not be at V_{HH} for operations other than accelerated programming, or device damage may result. WP# has an internal pullup; when unconnected, WP# is at V_{IH} .*

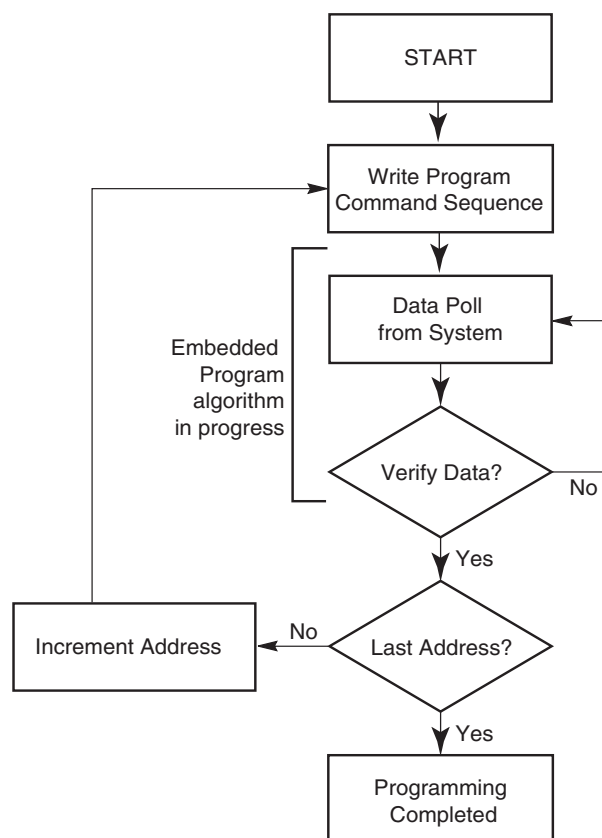
Figure 2, on page 55 illustrates the algorithm for the program operation. Refer to the Erase and Program Operations subsection of the “AC Characteristics” section on page 77 for parameters, and Figure 14, on page 81 for timing diagrams.



Notes:

1. When Sector Address is specified, any address in the selected sector is acceptable. However, when loading Write-Buffer address locations with data, all addresses must fall within the selected Write-Buffer Page.
2. DQ7 may change simultaneously with DQ5. Therefore, DQ7 should be verified.
3. If this flowchart location was reached because DQ5 = 1, then the device FAILED. If this flowchart location was reached because DQ1 = 1, then the Write to Buffer operation was ABORTED. In either case, the proper reset command must be written before the device can begin another operation. If DQ1=1, write the Write-Buffer-Programming-Abort-Reset command. If DQ5=1, write the Reset command.
4. See [Table 12 on page 63](#) and [Table 14 on page 65](#) for command sequences required for write buffer programming.

Figure I. Write Buffer Programming Operation



Note: See [Table 12 on page 63](#) and [Table 14 on page 65](#) for program command sequence.

Figure 2. Program Operation

Program Suspend/Program Resume Command Sequence

The Program Suspend command allows the system to interrupt a programming operation or a Write to Buffer programming operation so that data can be read from any non-suspended sector. When the Program Suspend command is written during a programming process, the device halts the program operation within 15 μs maximum (5 μs typical) and updates the status bits. Addresses are not required when writing the Program Suspend command.

After the programming operation is suspended, the system can read array data from any non-suspended sector. The Program Suspend command may also be issued during a programming operation while an erase is suspended. In this case, data may be read from any addresses not in Erase Suspend or Program Suspend. If a read is needed from the Secured Silicon Sector area (One-time Program area), then user must use the proper command sequences to enter and exit this region. *Note that the Secured Silicon Sector autoselect, and CFI functions are unavailable when program operation is in progress.*

The system may also write the autoselect command sequence when the device is in the Program Suspend mode. The system can read as many autoselect codes as required. When the device exits the autoselect mode, the device reverts to the Program Suspend mode, and is ready for another valid operation. See [Autoselect Command Sequence, on page 51](#) for more information.

After the Program Resume command is written, the device reverts to programming. The system can determine the status of the program operation using the DQ7 or DQ6 status bits, just

as in the standard program operation. See [Write Operation Status, on page 67](#) for more information.

The system must write the Program Resume command (address bits are don't care) to exit the Program Suspend mode and continue the programming operation. Further writes of the Resume command are ignored. Another Program Suspend command can be written after the device has resume programming.

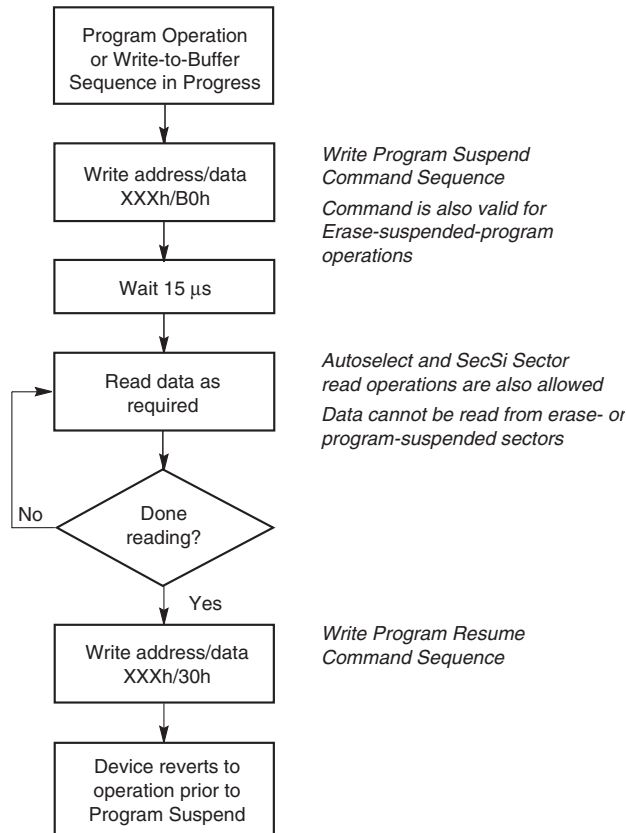


Figure 3. Program Suspend/Program Resume

Chip Erase Command Sequence

Chip erase is a six bus cycle operation. The chip erase command sequence is initiated by writing two unlock cycles, followed by a set-up command. Two additional unlock write cycles are then followed by the chip erase command, which in turn invokes the Embedded Erase algorithm. The device does *not* require the system to preprogram prior to erase. The Embedded Erase algorithm automatically preprograms and verifies the entire memory for an all zero data pattern prior to electrical erase. The system is not required to provide any controls or timings during these operations. [Table 12 on page 63](#) and [Table 14 on page 65](#) show the address and data requirements for the chip erase command sequence.

When the Embedded Erase algorithm is complete, the device returns to the read mode and addresses are no longer latched. The system can determine the status of the erase operation by using DQ7, DQ6, or DQ2. Refer to [Write Operation Status, on page 67](#) for information on these status bits.

Any commands written during the chip erase operation are ignored, including erase suspend commands. However, note that a **hardware reset** immediately terminates the erase opera-

tion. If that occurs, the chip erase command sequence should be reinitiated once the device has returned to reading array data, to ensure data integrity.

Figure 4, on page 58 illustrates the algorithm for the erase operation. **Note that the Secured Silicon Sector, autoselect, and CFI functions are unavailable when an erase operation is in progress.** Refer to the table *Erase and Program Operations, on page 80* for parameters, and Figure 16, on page 82 section for timing diagrams.

Sector Erase Command Sequence

Sector erase is a six bus cycle operation. The sector erase command sequence is initiated by writing two unlock cycles, followed by a set-up command. Two additional unlock cycles are written, and are then followed by the address of the sector to be erased, and the sector erase command. Table 12 on page 63 and Table 14 on page 65 shows the address and data requirements for the sector erase command sequence.

The device does *not* require the system to preprogram prior to erase. The Embedded Erase algorithm automatically programs and verifies the entire memory for an all zero data pattern prior to electrical erase. The system is not required to provide any controls or timings during these operations.

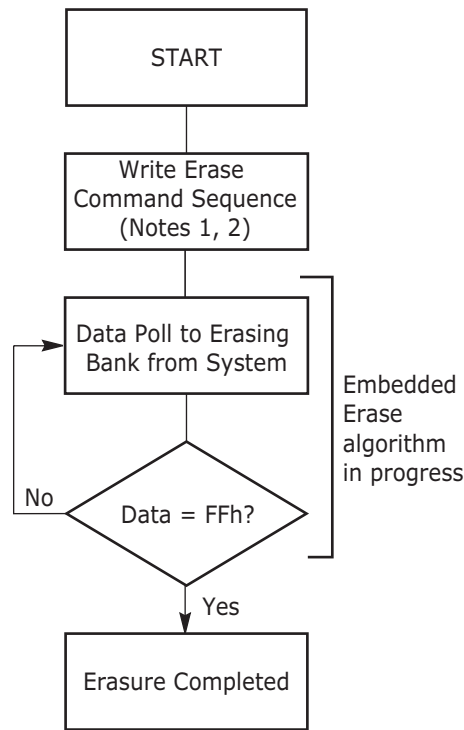
After the command sequence is written, a sector erase time-out of 50 μ s occurs. During the time-out period, additional sector addresses and sector erase commands may be written. Loading the sector erase buffer may be done in any sequence, and the number of sectors may be from one sector to all sectors. The time between these additional cycles must be less than 50 μ s, otherwise erasure may begin. Any sector erase address and command following the exceeded time-out may or may not be accepted. It is recommended that processor interrupts be disabled during this time to ensure all commands are accepted. The interrupts can be re-enabled after the last Sector Erase command is written. **Any command other than Sector Erase or Erase Suspend during the time-out period resets the device to the read mode. Note that the Secured Silicon Sector, autoselect, and CFI functions are unavailable when an erase operation is in progress.** The system must rewrite the command sequence and any additional addresses and commands.

The system can monitor DQ3 to determine if the sector erase timer has timed out (See *DQ3: Sector Erase Timer, on page 72*). The time-out begins from the rising edge of the final WE# pulse in the command sequence.

When the Embedded Erase algorithm is complete, the device returns to reading array data and addresses are no longer latched. The system can determine the status of the erase operation by reading DQ7, DQ6, or DQ2 in the erasing sector. Refer to the Write Operation Status section for information on these status bits.

Once the sector erase operation has begun, only the Erase Suspend command is valid. All other commands are ignored. However, note that a **hardware reset** immediately terminates the erase operation. If that occurs, the sector erase command sequence should be reinitiated once the device has returned to reading array data, to ensure data integrity.

Figure 4, on page 58 illustrates the algorithm for the erase operation. Refer to the table *Erase and Program Operations, on page 80* for parameters, and Figure 16, on page 82 for timing diagrams.



Notes:

1. See [Table 12 on page 63](#) and [Table 14 on page 65](#) for program command

Figure 4. Erase Operation

Erase Suspend/Erasure Resume Commands

The Erase Suspend command, B0h, allows the system to interrupt a sector erase operation and then read data from, or program data to, any sector not selected for erasure. This command is valid only during the sector erase operation, including the 50 μs time-out period during the sector erase command sequence. The Erase Suspend command is ignored if written during the chip erase operation or Embedded Program algorithm.

When the Erase Suspend command is written during the sector erase operation, the device requires a typical of 5 μs (maximum of 20 μs) to suspend the erase operation. However, when the Erase Suspend command is written during the sector erase time-out, the device immediately terminates the time-out period and suspends the erase operation.

After the erase operation is suspended, the device enters the erase-suspend-read mode. The system can read data from or program data to any sector not selected for erasure. (The device *erase suspends* all sectors selected for erasure.) Reading at any address within erase-suspended sectors produces status information on DQ7–DQ0. The system can use DQ7, or DQ6 and DQ2 together, to determine if a sector is actively erasing or is erase-suspended. Refer to the Write Operation Status section for information on these status bits.

After an erase-suspended program operation is complete, the device returns to the erase-suspend-read mode. The system can determine the status of the program operation using the DQ7 or DQ6 status bits, just as in the standard word program operation. Refer to [Write Operation Status, on page 67](#) for more information.

In the erase-suspend-read mode, the system can also issue the autoselect command sequence. Refer to the [Autoselect Mode, on page 37](#) section and [Autoselect Command Sequence, on page 51](#) for details.

To resume the sector erase operation, the system must write the Erase Resume command. The address of the erase-suspended sector is required when writing this command. Further writes of the Resume command are ignored. Another Erase Suspend command can be written after the chip has resumed erasing. It is important to allow an interval of at least 5 ms between Erase Resume and Erase Suspend.

Lock Register Command Set Definitions

The Lock Register Command Set permits the user to one-time program the Secured Silicon Sector Protection Bit, Persistent Protection Mode Lock Bit, and Password Protection Mode Lock Bit. The Lock Register bits are all readable after an initial access delay.

The **Lock Register Command Set Entry** command sequence must be issued prior to any of the following commands listed, to enable proper command execution.

Note that issuing the **Lock Register Command Set Entry** command **disables reads and writes for the flash memory**.

- Lock Register Program Command
- Lock Register Read Command

The **Lock Register Command Set Exit** command must be issued after the execution of the commands to reset the device to read mode. Otherwise the device hangs. If this happens, the flash device must be reset. Please refer to RESET# for more information. It is important to note that the device is in either Persistent Protection mode or Password Protection mode depending on the mode selected prior to the device hang.

For either the Secured Silicon Sector to be locked, or the device to be permanently set to the Persistent Protection Mode or the Password Protection Mode, the associated Lock Register bits must be programmed. Note that only the Persistent Protection Mode Lock Bit **or** the Password Protection Mode Lock Bit can be programmed. The Lock Register Program operation aborts if there is an attempt to program both the Persistent Protection Mode and the Password Protection Mode Lock bits.

The Lock Register Command Set Exit command must be initiated to re-enable reads and writes to the main memory.

Password Protection Command Set Definitions

The Password Protection Command Set permits the user to program the 64-bit password, verify the programming of the 64-bit password, and then later unlock the device by issuing the valid 64-bit password.

The **Password Protection Command Set Entry** command sequence must be issued prior to any of the commands listed following to enable proper command execution.

Note that issuing the **Password Protection Command Set Entry** command **disabled reads and writes the main memory**.

- Password Program Command
- Password Read Command
- Password Unlock Command

The Password Program command permits programming the password that is used as part of the hardware protection scheme. The actual password is 64-bits long. There is no special addressing order required for programming the password. **The password is programmed in 8-bit or 16-bit portions. Each portion requires a Password Program Command.**

Once the Password is written and verified, the Password Protection Mode Lock Bit in the *Lock Register* must be programmed in order to prevent verification. The Password Program command is only capable of programming 0s. Programming a 1 after a cell is programmed as a 0 results in a time-out by the Embedded Program Algorithm™ with the cell remaining as a 0. The password is all F's when shipped from the factory. All 64-bit password combinations are valid as a password.

The Password Read command is used to verify the Password. The Password is verifiable only when the Password Protection Mode Lock Bit in the *Lock Register* is not programmed. If the Password Protection Mode Lock Bit in the *Lock Register* is programmed and the user attempts to read the Password, the device always drives all F's onto the DQ databus.

The lower two address bits (A1–A0) for word mode and (A1–A-1) for by byte mode are valid during the Password Read, Password Program, and Password Unlock commands. **Writing a 1 to any other address bits (A_{MAX}-A2) aborts the Password Read and Password Program commands.**

The Password Unlock command is used to clear the PPB Lock Bit to the *unfreeze state* so that the PPB bits can be modified. The exact password must be entered in order for the unlocking function to occur. This 64-bit Password Unlock command sequence takes at least 2 μs to process each time to prevent a hacker from running through the all 64-bit combinations in an attempt to correctly match the password. If another password unlock is issued before the 64-bit password check execution window is completed, the command is ignored. If the wrong address or data is given during password unlock command cycle, the device may enter the write-to-buffer abort state. In order to exit the write-to-abort state, the write-to-buffer-abort-reset command must be given. Otherwise the device hangs.

The Password Unlock function is accomplished by writing Password Unlock command and data to the device to perform the clearing of the PPB Lock Bit to the *unfreeze state*. The password is 64 bits long. A1 and A0 are used for matching in word mode and A1, A0, A-1 in byte mode. Writing the Password Unlock command does not need to be address order specific. An example sequence is starting with the lower address A1-A0=00, followed by A1-A0=01, A1-A0=10, and A1-A0=11 if the device is configured to operate in word mode.

Approximately 2 μs is required for unlocking the device after the valid 64-bit password is given to the device. It is the responsibility of the microprocessor to keep track of the entering the portions of the 64-bit password with the Password Unlock command, the order, and when to read the PPB Lock bit to confirm successful password unlock. In order to re-lock the device into the Password Protection Mode, the PPB Lock Bit Set command can be re-issued.

Note: The Password Protection Command Set Exit command must be issued after the execution of the commands listed previously to reset the device to read mode. Otherwise the device hangs.

Note: Issuing the Password Protection Command Set Exit command re-enables reads and writes for the main memory.

Non-Volatile Sector Protection Command Set Definitions

The Non-Volatile Sector Protection Command Set permits the user to program the Persistent Protection Bits (PPB bits), erase all of the Persistent Protection Bits (PPB bits), and read the logic state of the Persistent Protection Bits (PPB bits).

The **Non-Volatile Sector Protection Command Set Entry** command sequence must be issued prior to any of the commands listed following to enable proper command execution.

Note that issuing the **Non-Volatile Sector Protection Command Set Entry** command **disables reads and writes for the main memory.**

- PPB Program Command

The PPB Program command is used to program, or set, a given PPB bit. Each PPB bit is individually programmed (but is bulk erased with the other PPB bits). The specific sector address (A24-A16 for S29GL512N, A23-A16 for S29GL256N, A22-A16 for S29GL128N) is written at the same time as the program command. If the PPB Lock Bit is set to the *freeze state*, the PPB Program command does not execute and the command times-out without programming the PPB bit.

■ All PPB Erase Command

The All PPB Erase command is used to erase all PPB bits in bulk. There is no means for individually erasing a specific PPB bit. Unlike the PPB program, no specific sector address is required. However, when the All PPB Erase command is issued, all Sector PPB bits are erased in parallel. If the PPB Lock Bit is set to *freeze state*, the ALL PPB Erase command does not execute and the command times-out without erasing the PPB bits.

The device preprograms all PPB bits prior to erasing when issuing the All PPB Erase command. Also note that the total number of PPB program/erase cycles has the same endurance as the flash memory array.

■ PPB Status Read Command

The programming state of the PPB for a given sector can be verified by writing a PPB Status Read Command to the device. This requires an initial access time latency.

The **Non-Volatile Sector Protection Command Set Exit** command must be issued after the execution of the commands listed previously to reset the device to read mode.

Note that issuing the **Non-Volatile Sector Protection Command Set Exit** command **re-enables reads and writes for the main memory**.

Global Volatile Sector Protection Freeze Command Set

The Global Volatile Sector Protection Freeze Command Set permits the user to set the PPB Lock Bit and reading the logic state of the PPB Lock Bit.

The **Global Volatile Sector Protection Freeze Command Set Entry** command sequence must be issued prior to any of the commands listed following to enable proper command execution.

Reads and writes from the main memory are not allowed.

■ PPB Lock Bit Set Command

The PPB Lock Bit Set command is used to set the PPB Lock Bit to the *freeze state* if it is cleared either at reset or if the Password Unlock command was successfully executed. There is no PPB Lock Bit Clear command. Once the PPB Lock Bit is set to the *freeze state*, it cannot be cleared unless the device is taken through a power-on clear (for Persistent Protection Mode) or the Password Unlock command is executed (for Password Protection Mode). If the Password Protection Mode Lock Bit is programmed, the PPB Lock Bit status is reflected as set to the *freeze state*, even after a power-on reset cycle.

■ PPB Lock Bit Status Read Command

The programming state of the PPB Lock Bit can be verified by executing a PPB Lock Bit Status Read command to the device.

The **Global Volatile Sector Protection Freeze Command Set Exit** command must be issued after the execution of the commands listed previously to reset the device to read mode.

Volatile Sector Protection Command Set

The Volatile Sector Protection Command Set permits the user to set the Dynamic Protection Bit (DYB) to the *protected state*, clear the Dynamic Protection Bit (DYB) to the *unprotected state*, and read the logic state of the Dynamic Protection Bit (DYB).

The **Volatile Sector Protection Command Set Entry** command sequence must be issued prior to any of the commands listed following to enable proper command execution.

Note that issuing the **Volatile Sector Protection Command Set Entry** command **disables reads and writes from main memory**.

- DYB Set Command
- DYB Clear Command

The DYB Set and DYB Clear commands are used to protect or unprotect a given sector. The high order address bits are issued at the same time as the code 00h or 01h on DQ7-DQ0. All other DQ data bus pins are ignored during the data write cycle. The DYB bits are modifiable at any time, regardless of the state of the PPB bit or PPB Lock Bit. The DYB bits are cleared to the *unprotected state* at power-up or hardware reset.

- DYB Status Read Command

The programming state of the DYB bit for a given sector can be verified by writing a DYB Status Read command to the device. This requires an initial access delay.

The **Volatile Sector Protection Command Set Exit** command must be issued after the execution of the commands listed previously to reset the device to read mode.

Note that issuing the **Volatile Sector Protection Command Set Exit** command **re-enables reads and writes to the main memory**.

Secured Silicon Sector Entry Command

The Secured Silicon Sector Entry command allows the following commands to be executed

- Read from Secured Silicon Sector
- Program to Secured Silicon Sector

Once the Secured Silicon Sector Entry Command is issued, the Secured Silicon Sector Exit command has to be issued to exit Secured Silicon Sector Mode.

Secured Silicon Sector Exit Command

The Secured Silicon Sector Exit command may be issued to exit the Secured Silicon Sector Mode.

Command Definitions

Table I2. Memory Array Commands (x16)

| Command Sequence (Notes) | | Cycles | Bus Cycles (Notes 1–5) | | | | | | | | | | | |
|----------------------------------|---------------------------|--------|------------------------|------|--------|------|-------|------|---------|------|-------|------|-------|------|
| | | | First | | Second | | Third | | Fourth | | Fifth | | Sixth | |
| | | | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data |
| Asynchronous Read (6) | | 1 | RA | RD | | | | | | | | | | |
| Reset (7) | | 1 | XXX | F0 | | | | | | | | | | |
| Auto-select | Manufacturer ID | 4 | 555 | AA | 2AA | 55 | 555 | 90 | X00 | 01 | | | | |
| | Device ID (8) | 6 | 555 | AA | 2AA | 55 | 555 | 90 | X01 | 227E | X0E | Data | X0F | Data |
| | Sector Protect Verify (9) | 4 | 555 | AA | 2AA | 55 | 555 | 90 | [SA]X02 | Data | | | | |
| | Secure Device Verify (10) | 4 | 555 | AA | 2AA | 55 | 555 | 90 | X03 | Data | | | | |
| CFI Query (11) | | 1 | 55 | 98 | | | | | | | | | | |
| Program | | 4 | 555 | AA | 2AA | 55 | 555 | A0 | PA | PD | | | | |
| Write to Buffer (12) | | 6 | 555 | AA | 2AA | 55 | PA | 25 | SA | WC | PA | PD | WBL | PD |
| Program Buffer to Flash | | 1 | SA | 29 | | | | | | | | | | |
| Write to Buffer Abort Reset (13) | | 3 | 555 | AA | 2AA | 55 | 555 | F0 | | | | | | |
| Unlock Bypass Mode | Entry | 3 | 555 | AA | 2AA | 55 | 555 | 20 | | | | | | |
| | Program (14) | 2 | XXX | A0 | PA | PD | | | | | | | | |
| | Sector Erase (14) | 2 | XXX | 80 | SA | 30 | | | | | | | | |
| | Chip Erase (14) | 2 | XXX | 80 | SA | 10 | | | | | | | | |
| | Reset | 2 | XXX | 90 | XXX | 00 | | | | | | | | |
| Chip Erase | | 6 | 555 | AA | 2AA | 55 | 555 | 80 | 555 | AA | 2AA | 55 | 555 | 10 |
| Sector Erase | | 6 | 555 | AA | 2AA | 55 | 555 | 80 | 555 | AA | 2AA | 55 | SA | 30 |
| Erase/Program Suspend (15) | | 1 | XXX | B0 | | | | | | | | | | |
| Erase/Program Resume (16) | | 1 | XXX | 30 | | | | | | | | | | |
| Secured Silicon Sector | Entry | 3 | 555 | AA | 2AA | 55 | 555 | 88 | | | | | | |
| | Program (17) | 4 | 555 | AA | 2AA | 55 | 555 | A0 | PA | PD | | | | |
| | Read (17) | 1 | 00 | Data | | | | | | | | | | |
| | Exit (17) | 4 | 555 | AA | 2AA | 55 | 555 | 90 | XXX | 00 | | | | |

Legend:

X = Don't care.

RA = Read Address.

RD = Read Data.

PA = Program Address. Addresses latch on the falling edge of WE# or CE# pulse, whichever occurs later.

PD = Program Data. Data latches on the rising edge of WE# or CE# pulse, whichever occurs first.

SA = Sector Address. Any address that falls within a specified sector. See Tables 2–4 for sector address ranges.

WBL = Write Buffer Location. Address must be within the same write buffer page as PA.

WC = Word Count. Number of write buffer locations to load minus 1.

Notes:

- See Table 1 on page 13 for description of bus operations.
- All values are in hexadecimal.
- Shaded cells indicate read cycles.
- Address and data bits not specified in table, legend, or notes are don't cares (each hex digit implies 4 bits of data).
- Writing incorrect address and data values or writing them in the improper sequence may place the device in an unknown state. The system must write the reset command to return reading array data.
- No unlock or command cycles required when bank is reading array data.
- Reset command is required to return to reading array data in certain cases. See [Reset Command](#) section for details.
- Data in cycles 5 and 6 are listed in Table 5 on page 37.
- The data is 00h for an unprotected sector and 01h for a protected sector. PPB Status Read provides the same data but in inverted form.
- If DQ7 = 1, region is factory serialized and protected. If DQ7 = 0, region is unserialized and unprotected when shipped from factory. See [Secured Silicon Sector Flash Memory Region](#) on page 43 for more information.

- Command is valid when device is ready to read array data or when device is in autoselect mode.
- Total number of cycles in the command sequence is determined by the number of words written to the write buffer.
- Command sequence resets device for next command after write-to-buffer operation.
- Requires Entry command sequence prior to execution. Unlock Bypass Reset command is required to return to reading array data.
- System may read and program in non-erasing sectors, or enter the autoselect mode, when in the Erase Suspend mode. The Erase Suspend command is valid only during a sector erase operation.
- Erase Resume command is valid only during the Erase Suspend mode.
- Requires Entry command sequence prior to execution. Secured Silicon Sector Exit Reset command is required to exit this mode; device may otherwise be placed in an unknown state.

Table 13. Sector Protection Commands (x16)

| Command Sequence (Notes) | | Cycles | Bus Cycles (Notes 1–4) | | | | | | | | | | | | | |
|---|--------------------------|--------|------------------------|-------|--------|------|-------|------|--------|------|-------|------|-------|------|---------|------|
| | | | First | | Second | | Third | | Fourth | | Fifth | | Sixth | | Seventh | |
| | | | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data |
| Lock Register Bits | Command Set Entry (5) | 3 | 555 | AA | 2AA | 55 | 555 | 40 | | | | | | | | |
| | Program (6) | 2 | XX | A0 | XXX | Data | | | | | | | | | | |
| | Read (6) | 1 | 00 | Data | | | | | | | | | | | | |
| | Command Set Exit (7) | 2 | XX | 90 | XX | 00 | | | | | | | | | | |
| Password Protection | Command Set Entry (5) | 3 | 555 | AA | 2AA | 55 | 555 | 60 | | | | | | | | |
| | Program (8) | 2 | XX | A0 | PWax | PWDx | | | | | | | | | | |
| | Read (9) | 4 | XXX | PWD0 | 01 | PWD1 | 02 | PWD2 | 03 | PWD3 | | | | | | |
| | Unlock (10) | 7 | 00 | 25 | 00 | 03 | 00 | PWD0 | 01 | PWD1 | 02 | PWD2 | 03 | PWD3 | 00 | 29 |
| | Command Set Exit (7) | 2 | XX | 90 | XX | 00 | | | | | | | | | | |
| Non-Volatile Sector Protection (PPB) | Command Set Entry (5) | 3 | 555 | AA | 2AA | 55 | 555 | C0 | | | | | | | | |
| | PPB Program (11) | 2 | XX | A0 | SA | 00 | | | | | | | | | | |
| | All PPB Erase (11, 12) | 2 | XX | 80 | 00 | 30 | | | | | | | | | | |
| | PPB Status Read | 1 | SA | RD(0) | | | | | | | | | | | | |
| Global Volatile Sector Protection Freeze (PPB Lock) | Command Set Entry (5) | 3 | 555 | AA | 2AA | 55 | 555 | 50 | | | | | | | | |
| | PPB Lock Bit Set | 2 | XX | A0 | XX | 00 | | | | | | | | | | |
| | PPB Lock Bit Status Read | 1 | XXX | RD(0) | | | | | | | | | | | | |
| | Command Set Exit (7) | 2 | XX | 90 | XX | 00 | | | | | | | | | | |
| Volatile Sector Protection (DYB) | Command Set Entry (5) | 3 | 555 | AA | 2AA | 55 | 555 | E0 | | | | | | | | |
| | DYB Set | 2 | XX | A0 | SA | 00 | | | | | | | | | | |
| | DYB Clear | 2 | XX | A0 | SA | 01 | | | | | | | | | | |
| | DYB Status Read | 1 | SA | RD(0) | | | | | | | | | | | | |
| Command Set Exit (7) | 2 | XX | 90 | XX | 00 | | | | | | | | | | | |

Legend:

X = Don't care.

RA = Address of the memory location to be read.

SA = Sector Address. Any address that falls within a specified sector. See Tables 2–4 for sector address ranges.

PWA = Password Address. Address bits A1 and A0 are used to select each 16-bit portion of the 64-bit entity.

PWD = Password Data.

RD(0) = DQ0 protection indicator bit. If protected, DQ0 = 0. If unprotected, DQ0 = 1.

Notes:

- All values are in hexadecimal.
- Shaded cells indicate read cycles.
- Address and data bits not specified in table, legend, or notes are don't cares (each hex digit implies 4 bits of data).
- Writing incorrect address and data values or writing them in the improper sequence may place the device in an unknown state. The system must write the reset command to return the device to reading array data.
- Entry commands are required to enter a specific mode to enable instructions only available within that mode.
- No unlock or command cycles required when bank is reading array data.
- Exit command must be issued to reset the device into read mode; device may otherwise be placed in an unknown state.
- Entire two bus-cycle sequence must be entered for each portion of the password.
- Full address range is required for reading password.
- Password may be unlocked or read in any order. Unlocking requires the full password (all seven cycles).
- ACC must be at V_{IH} when setting PPB or DYB.
- "All PPB Erase" command pre-programs all PPBs before erasure to prevent over-erasure.

Table I4. Memory Array Commands (x8)

| Command Sequence (Notes) | | Cycles | Bus Cycles (Notes 1–5) | | | | | | | | | | | |
|----------------------------------|---------------------------|--------|------------------------|------|--------|------|-------|------|---------|------|-------|------|-------|------|
| | | | First | | Second | | Third | | Fourth | | Fifth | | Sixth | |
| | | | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data |
| Asynchronous Read (6) | | 1 | RA | RD | | | | | | | | | | |
| Reset (7) | | 1 | XXX | FO | | | | | | | | | | |
| Auto-select | Manufacturer ID | 4 | AAA | AA | 555 | 55 | AAA | 90 | X00 | 01 | | | | |
| | Device ID (8) | 6 | AAA | AA | 555 | 55 | AAA | 90 | X02 | XX7E | X1C | Data | X1E | Data |
| | Sector Protect Verify (9) | 4 | AAA | AA | 555 | 55 | AAA | 90 | [SA]X04 | Data | | | | |
| | Secure Device Verify (10) | 4 | AAA | AA | 555 | 55 | AAA | 90 | X06 | Data | | | | |
| CFI Query (11) | | 1 | AA | 98 | | | | | | | | | | |
| Program | | 4 | AAA | AA | 555 | 55 | AAA | A0 | PA | PD | | | | |
| Write to Buffer (12) | | 6 | AAA | AA | 555 | 55 | PA | 25 | SA | WC | PA | PD | WBL | PD |
| Program Buffer to Flash | | 1 | SA | 29 | | | | | | | | | | |
| Write to Buffer Abort Reset (13) | | 3 | AAA | AA | PA | 55 | 555 | FO | | | | | | |
| Unlock Bypass Mode | Entry | 3 | AAA | AA | 555 | 55 | AAA | 20 | | | | | | |
| | Program (14) | 2 | XXX | A0 | PA | PD | | | | | | | | |
| | Sector Erase (14) | 2 | XXX | 80 | SA | 30 | | | | | | | | |
| | Chip Erase (14) | 2 | XXX | 80 | SA | 10 | | | | | | | | |
| | Reset | 2 | XXX | 90 | XXX | 00 | | | | | | | | |
| Chip Erase | | 6 | AAA | AA | 555 | 55 | AAA | 80 | AAA | AA | 555 | 55 | AAA | 10 |
| Sector Erase | | 6 | AAA | AA | 555 | 55 | AAA | 80 | AAA | AA | 555 | 55 | SA | 30 |
| Erase/Program Suspend (15) | | 1 | XXX | B0 | | | | | | | | | | |
| Erase/Program Resume (16) | | 1 | XXX | 30 | | | | | | | | | | |
| Secured Silicon Sector | Entry | 3 | AAA | AA | 555 | 55 | AAA | 88 | | | | | | |
| | Program (17) | 4 | AAA | AA | 555 | 55 | AAA | A0 | PA | PD | | | | |
| | Read (17) | 1 | 00 | Data | | | | | | | | | | |
| | Exit (17) | 4 | AAA | AA | 555 | 55 | AAA | 90 | XXX | 00 | | | | |

Legend:

X = Don't care.
 RA = Read Address.
 RD = Read Data.
 PA = Program Address. Addresses latch on the falling edge of WE# or CE# pulse, whichever occurs later.

PD = Program Data. Data latches on the rising edge of WE# or CE# pulse, whichever occurs first.
 SA = Sector Address. Any address that falls within a specified sector. See Tables 2–4 for sector address ranges.
 WBL = Write Buffer Location. Address must be within the same write buffer page as PA.
 WC = Word Count. Number of write buffer locations to load minus 1.

Notes:

- See Table 1 on page 13 for description of bus operations.
- All values are in hexadecimal.
- Shaded cells indicate read cycles.
- Address and data bits not specified in table, legend, or notes are don't cares (each hex digit implies 4 bits of data).
- Writing incorrect address and data values or writing them in the improper sequence may place the device in an unknown state. The system must write the reset command to return reading array data.
- No unlock or command cycles required when bank is reading array data.
- Reset command is required to return to reading array data in certain cases. See [Reset Command](#) section for details.
- Data in cycles 5 and 6 are listed in Table 5 on page 37.
- The data is 00h for an unprotected sector and 01h for a protected sector. PPB Status Read provides the same data but in inverted form.
- If DQ7 = 1, region is factory serialized and protected. If DQ7 = 0, region is unserialized and unprotected when shipped from factory. See [Secured Silicon Sector Flash Memory Region](#) on page 43 for more information.
- Command is valid when device is ready to read array data or when device is in autoselect mode.
- Total number of cycles in the command sequence is determined by the number of words written to the write buffer.
- Command sequence resets device for next command after write-to-buffer operation.
- Requires Entry command sequence prior to execution. Unlock Bypass Reset command is required to return to reading array data.
- System may read and program in non-erasing sectors, or enter the autoselect mode, when in the Erase Suspend mode. The Erase Suspend command is valid only during a sector erase operation.
- Erase Resume command is valid only during the Erase Suspend mode.
- Requires Entry command sequence prior to execution. Secured Silicon Sector Exit Reset command is required to exit this mode; device may otherwise be placed in an unknown state.

Table 15. Sector Protection Commands (x8)

| Command Sequence (Notes) | | Cycles | Bus Cycles (Notes 1-4) | | | | | | | | | | | | | | |
|---|--------------------------|--------|------------------------|-------|---------|------|----------|------|----------|------|------|------|------|------|------|------|--|
| | | | 1st/8th | | 2nd/9th | | 3rd/10th | | 4th/11th | | 5th | | 6th | | 7th | | |
| | | | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data | Addr | Data | |
| Lock Register Bits | Command Set Entry (5) | 3 | AAA | AA | 555 | 55 | AAA | 40 | | | | | | | | | |
| | Program (6) | 2 | XXX | A0 | XXX | Data | | | | | | | | | | | |
| | Read (6) | 1 | 00 | Data | | | | | | | | | | | | | |
| | Command Set Exit (7) | 2 | XXX | 90 | XXX | 00 | | | | | | | | | | | |
| Password Protection | Command Set Entry (5) | 3 | AAA | AA | 555 | 55 | AAA | 60 | | | | | | | | | |
| | Program (8) | 2 | XXX | A0 | PWAX | PWDx | | | | | | | | | | | |
| | Read (9) | 8 | 00 | PWD0 | 01 | PWD1 | 02 | PWD2 | 03 | PWD3 | 04 | PWD4 | 05 | PWD5 | 06 | PWD6 | |
| | | | 07 | PWD7 | | | | | | | | | | | | | |
| | Unlock (10) | 11 | 00 | 25 | 00 | 03 | 00 | PWD0 | 01 | PWD1 | 02 | PWD2 | 03 | PWD3 | 04 | PWD4 | |
| 05 | | | PWD5 | 06 | PWD6 | 07 | PWD7 | 00 | 29 | | | | | | | | |
| Command Set Exit (7) | 2 | XX | 90 | XX | 00 | | | | | | | | | | | | |
| Non-Volatile Sector Protection (PPB) | Command Set Entry (5) | 3 | AAA | AA | 555 | 55 | AAA | C0 | | | | | | | | | |
| | PPB Program (11) | 2 | XXX | A0 | SA | 00 | | | | | | | | | | | |
| | All PPB Erase (11, 12) | 2 | XXX | 80 | 00 | 30 | | | | | | | | | | | |
| | PPB Status Read | 1 | SA | RD(0) | | | | | | | | | | | | | |
| Command Set Exit (7) | 2 | XXX | 90 | XXX | 00 | | | | | | | | | | | | |
| Global Volatile Sector Protection Freeze (PPB Lock) | Command Set Entry (5) | 3 | AAA | AA | 555 | 55 | AAA | 50 | | | | | | | | | |
| | PPB Lock Bit Set | 2 | XXX | A0 | XXX | 00 | | | | | | | | | | | |
| | PPB Lock Bit Status Read | 1 | XXX | RD(0) | | | | | | | | | | | | | |
| | Command Set Exit (7) | 2 | XXX | 90 | XX | 00 | | | | | | | | | | | |
| Volatile Sector Protection (DYB) | Command Set Entry (5) | 3 | AAA | AA | 555 | 55 | AAA | E0 | | | | | | | | | |
| | DYB Set | 2 | XXX | A0 | SA | 00 | | | | | | | | | | | |
| | DYB Clear | 2 | XXX | A0 | SA | 01 | | | | | | | | | | | |
| | DYB Status Read | 1 | SA | RD(0) | | | | | | | | | | | | | |
| | Command Set Exit (7) | 2 | XXX | 90 | XXX | 00 | | | | | | | | | | | |

Legend:

X = Don't care.

RA = Address of the memory location to be read.

SA = Sector Address. Any address that falls within a specified sector. See Tables 2-4 for sector address ranges.

PWA = Password Address. Address bits A1 and A0 are used to select each 16-bit portion of the 64-bit entity.

PWD = Password Data.

RD(0) = DQ0 protection indicator bit. If protected, DQ0 = 0. If unprotected, DQ0 = 1.

Notes:

1. All values are in hexadecimal.
2. Shaded cells indicate read cycles.
3. Address and data bits not specified in table, legend, or notes are don't cares (each hex digit implies 4 bits of data).
4. Writing incorrect address and data values or writing them in the improper sequence may place the device in an unknown state. The system must write the reset command to return the device to reading array data.
5. Entry commands are required to enter a specific mode to enable instructions only available within that mode.

6. No unlock or command cycles required when bank is reading array data.
7. Exit command must be issued to reset the device into read mode; device may otherwise be placed in an unknown state.
8. Entire two bus-cycle sequence must be entered for each portion of the password.
9. Full address range is required for reading password.
10. Password may be unlocked or read in any order. Unlocking requires the full password (all seven cycles).
11. ACC must be at V_{IH} when setting PPB or DYB.
12. "All PPB Erase" command pre-programs all PPBs before erasure to prevent over-erasure.

Write Operation Status

The device provides several bits to determine the status of a program or erase operation: DQ2, DQ3, DQ5, DQ6, and DQ7. [Table 16 on page 72](#) and the following subsections describe the function of these bits. DQ7 and DQ6 each offer a method for determining whether a program or erase operation is complete or in progress. The device also provides a hardware-based output signal, RY/BY#, to determine whether an Embedded Program or Erase operation is in progress or is completed.

DQ7: Data# Polling

The Data# Polling bit, DQ7, indicates to the host system whether an Embedded Program or Erase algorithm is in progress or completed, or whether the device is in Erase Suspend. Data# Polling is valid after the rising edge of the final WE# pulse in the command sequence.

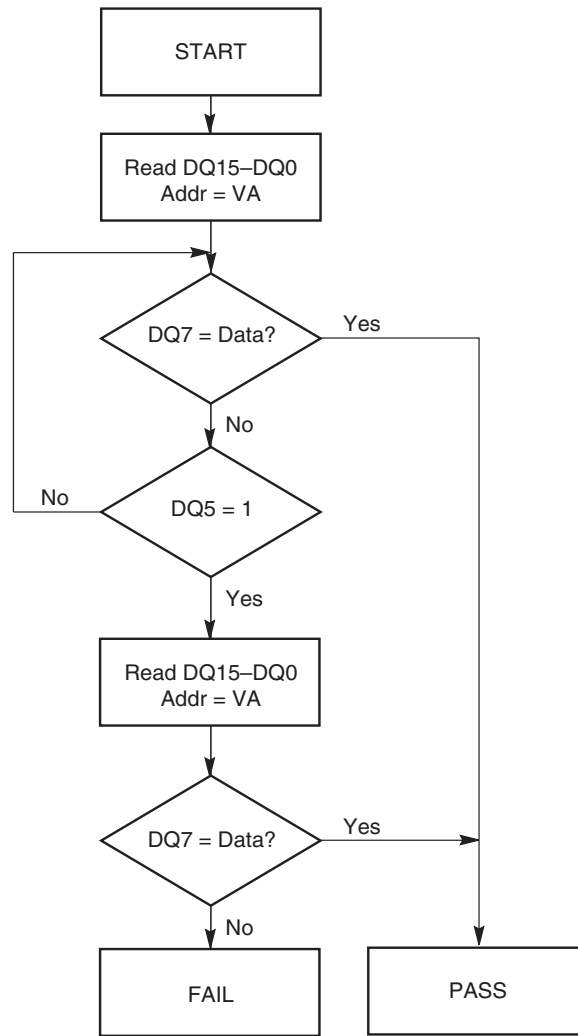
During the Embedded Program algorithm, the device outputs on DQ7 the complement of the datum programmed to DQ7. This DQ7 status also applies to programming during Erase Suspend. When the Embedded Program algorithm is complete, the device outputs the datum programmed to DQ7. The system must provide the program address to read valid status information on DQ7. If a program address falls within a protected sector, Data# Polling on DQ7 is active for approximately 1 μ s, then the device returns to the read mode.

During the Embedded Erase algorithm, Data# Polling produces a 0 on DQ7. When the Embedded Erase algorithm is complete, or if the device enters the Erase Suspend mode, Data# Polling produces a 1 on DQ7. The system must provide an address within any of the sectors selected for erasure to read valid status information on DQ7.

After an erase command sequence is written, if all sectors selected for erasing are protected, Data# Polling on DQ7 is active for approximately 100 μ s, then the device returns to the read mode. If not all selected sectors are protected, the Embedded Erase algorithm erases the unprotected sectors, and ignores the selected sectors that are protected. However, if the system reads DQ7 at an address within a protected sector, the status may not be valid.

Just prior to the completion of an Embedded Program or Erase operation, DQ7 may change asynchronously with DQ0–DQ6 while Output Enable (OE#) is asserted low. That is, the device may change from providing status information to valid data on DQ7. Depending on when the system samples the DQ7 output, it may read the status or valid data. Even if the device has completed the program or erase operation and DQ7 has valid data, the data outputs on DQ0–DQ6 may be still invalid. Valid data on DQ0–DQ7 appears on successive read cycles.

[Table 16 on page 72](#) shows the outputs for Data# Polling on DQ7. [Figure 5, on page 68](#) shows the Data# Polling algorithm. [Figure 14, on page 81](#) shows the Data# Polling timing diagram.



Notes:

1. VA = Valid address for programming. During a sector erase operation, a valid address is any sector address within the sector being erased. During chip erase, a valid address is any non-protected sector address.
2. DQ7 should be rechecked even if DQ5 = 1 because DQ7 may change simultaneously with DQ5.

Figure 5. Data# Polling Algorithm

RY/BY#: Ready/Busy#

The RY/BY# is a dedicated, open-drain output pin which indicates whether an Embedded Algorithm is in progress or complete. The RY/BY# status is valid after the rising edge of the final WE# pulse in the command sequence. Since RY/BY# is an open-drain output, several RY/BY# pins can be tied together in parallel with a pull-up resistor to V_{CC}.

If the output is low (Busy), the device is actively erasing or programming. (This includes programming in the Erase Suspend mode.) If the output is high (Ready), the device is in the read mode, the standby mode, or in the erase-suspend-read mode. [Table 16 on page 72](#) shows the outputs for RY/BY#.

DQ6: Toggle Bit I

Toggle Bit I on DQ6 indicates whether an Embedded Program or Erase algorithm is in progress or complete, or whether the device has entered the Erase Suspend mode. Toggle Bit I may be read at any address, and is valid after the rising edge of the final WE# pulse in the command sequence (prior to the program or erase operation), and during the sector erase time-out.

During an Embedded Program or Erase algorithm operation, successive read cycles to any address cause DQ6 to toggle. The system may use either OE# or CE# to control the read cycles. When the operation is complete, DQ6 stops toggling.

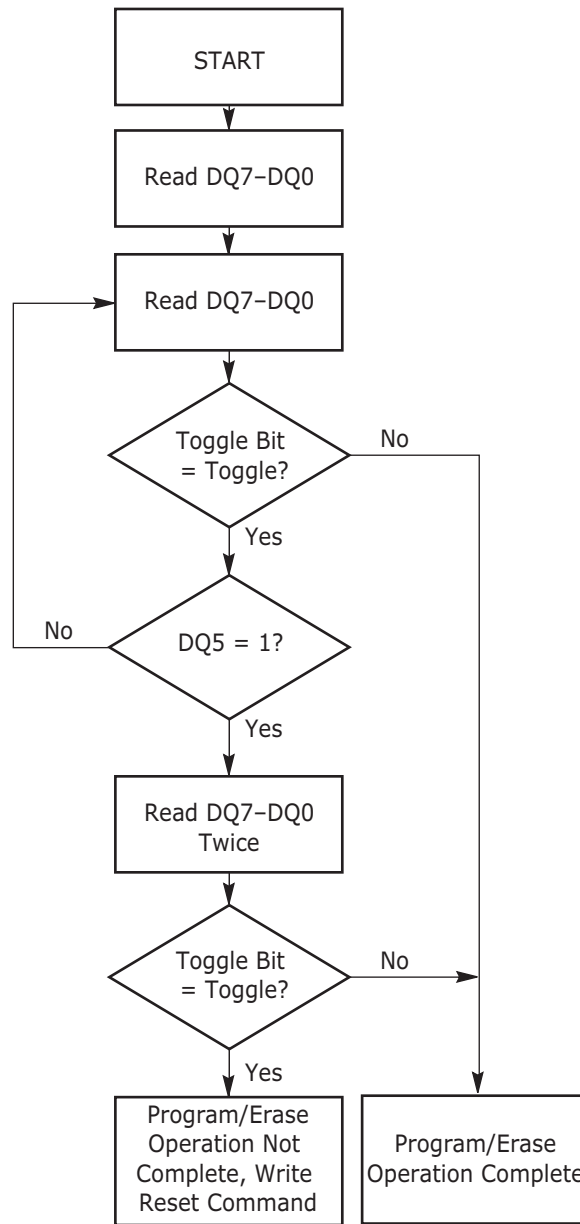
After an erase command sequence is written, if all sectors selected for erasing are protected, DQ6 toggles for approximately 100 μ s, then returns to reading array data. If not all selected sectors are protected, the Embedded Erase algorithm erases the unprotected sectors, and ignores the selected sectors that are protected.

The system can use DQ6 and DQ2 together to determine whether a sector is actively erasing or is erase-suspended. When the device is actively erasing (that is, the Embedded Erase algorithm is in progress), DQ6 toggles. When the device enters the Erase Suspend mode, DQ6 stops toggling. However, the system must also use DQ2 to determine which sectors are erasing or erase-suspended. Alternatively, the system can use DQ7 (see the subsection on DQ7: Data# Polling).

If a program address falls within a protected sector, DQ6 toggles for approximately 1 μ s after the program command sequence is written, then returns to reading array data.

DQ6 also toggles during the erase-suspend-program mode, and stops toggling once the Embedded Program algorithm is complete.

[Table 16 on page 72](#) shows the outputs for Toggle Bit I on DQ6. [Figure 6, on page 70](#) shows the toggle bit algorithm. [Figure 18, on page 84](#) shows the toggle bit timing diagrams. [Figure 19, on page 84](#) shows the differences between DQ2 and DQ6 in graphical form. See also the subsection on [DQ2: Toggle Bit II](#).



Note:

The system should recheck the toggle bit even if DQ5 = 1 because the toggle bit may stop toggling as DQ5 changes to 1. See the subsections on DQ6 and DQ2 for more information.

Figure 6. Toggle Bit Algorithm

DQ2: Toggle Bit II

The *Toggle Bit II* on DQ2, when used with DQ6, indicates whether a particular sector is actively erasing (that is, the Embedded Erase algorithm is in progress), or whether that sector is erase-suspended. Toggle Bit II is valid after the rising edge of the final WE# pulse in the command sequence.

DQ2 toggles when the system reads at addresses within those sectors that have been selected for erasure. (The system may use either OE# or CE# to control the read cycles.) But DQ2 cannot distinguish whether the sector is actively erasing or is erase-suspended. DQ6, by comparison, indicates whether the device is actively erasing, or is in Erase Suspend, but cannot distinguish which sectors are selected for erasure. Thus, both status bits are required for sector and mode information. Refer to [Table 16 on page 72](#) to compare outputs for DQ2 and DQ6.

[Figure 6, on page 70](#) shows the toggle bit algorithm in flowchart form, and the section [DQ2: Toggle Bit II](#) explains the algorithm. See also the [RY/BY#: Ready/Busy#](#) subsection. [Figure 18, on page 84](#) shows the toggle bit timing diagram. [Figure 19, on page 84](#) shows the differences between DQ2 and DQ6 in graphical form.

Reading Toggle Bits DQ6/DQ2

Refer to [Figure 6, on page 70](#) and [Figure 19, on page 84](#) for the following discussion. Whenever the system initially begins reading toggle bit status, it must read DQ7–DQ0 at least twice in a row to determine whether a toggle bit is toggling. Typically, the system would note and store the value of the toggle bit after the first read. After the second read, the system would compare the new value of the toggle bit with the first. If the toggle bit is not toggling, the device has completed the program or erase operation. The system can read array data on DQ7–DQ0 on the following read cycle.

However, if after the initial two read cycles, the system determines that the toggle bit is still toggling, the system also should note whether the value of DQ5 is high (see the section on DQ5). If it is, the system should then determine again whether the toggle bit is toggling, since the toggle bit may have stopped toggling just as DQ5 went high. If the toggle bit is no longer toggling, the device has successfully completed the program or erase operation. If it is still toggling, the device did not complete the operation successfully, and the system must write the reset command to return to reading array data.

The remaining scenario is that the system initially determines that the toggle bit is toggling and DQ5 has not gone high. The system may continue to monitor the toggle bit and DQ5 through successive read cycles, determining the status as described in the previous paragraph. Alternatively, it may choose to perform other system tasks. In this case, the system must start at the beginning of the algorithm when it returns to determine the status of the operation (top of [Figure 6, on page 70](#)).

DQ5: Exceeded Timing Limits

DQ5 indicates whether the program, erase, or write-to-buffer time has exceeded a specified internal pulse count limit. Under these conditions DQ5 produces a *1*, indicating that the program or erase cycle was not successfully completed.

The device may output a *1* on DQ5 if the system tries to program a *1* to a location that was previously programmed to *0*. **Only an erase operation can change a *0* back to a *1*.** Under this condition, the device halts the operation, and when the timing limit is exceeded, DQ5 produces a *1*.

In all these cases, the system must write the reset command to return the device to the reading the array (or to erase-suspend-read if the device was previously in the erase-suspend-program mode).

DQ3: Sector Erase Timer

After writing a sector erase command sequence, the system may read DQ3 to determine whether or not erasure has begun. (The sector erase timer does not apply to the chip erase command.) If additional sectors are selected for erasure, the entire time-out also applies after each additional sector erase command. When the time-out period is complete, DQ3 switches from a 0 to a 1. If the time between additional sector erase commands from the system can be assumed to be less than 50 μ s, the system need not monitor DQ3. See also [Sector Erase Command Sequence, on page 57](#).

After the sector erase command is written, the system should read the status of DQ7 (Data# Polling) or DQ6 (Toggle Bit I) to ensure that the device has accepted the command sequence, and then read DQ3. If DQ3 is 1, the Embedded Erase algorithm has begun; all further commands (except Erase Suspend) are ignored until the erase operation is complete. If DQ3 is 0, the device accepts additional sector erase commands. To ensure the command is accepted, the system software should check the status of DQ3 prior to and following each subsequent sector erase command. If DQ3 is high on the second status check, the last command might not have been accepted.

[Table 16 on page 72](#) shows the status of DQ3 relative to the other status bits.

DQ1: Write-to-Buffer Abort

DQ1 indicates whether a Write-to-Buffer operation was aborted. Under these conditions DQ1 produces a 1. The system must issue the Write-to-Buffer-Abort-Reset command sequence to return the device to reading array data. See [Write Buffer, on page 14](#) for more details.

Table 16. Write Operation Status

| Status | | | DQ7 (Note 2) | DQ6 | DQ5 (Note 1) | DQ3 | DQ2 (Note 2) | DQ1 | RY/BY# |
|----------------------|--|------------------------------|-----------------------|-----------|-----------------|-----|-----------------|-----|--------|
| Standard Mode | Embedded Program Algorithm | | DQ7# | Toggle | 0 | N/A | No toggle | 0 | 0 |
| | Embedded Erase Algorithm | | 0 | Toggle | 0 | 1 | Toggle | N/A | 0 |
| Program Suspend Mode | Program-Suspend Read | Program-Suspended Sector | Invalid (not allowed) | | | | | | 1 |
| | | Non-Program Suspended Sector | Data | | | | | | 1 |
| Erase Suspend Mode | Erase-Suspend Read | Erase-Suspended Sector | 1 | No toggle | 0 | N/A | Toggle | N/A | 1 |
| | | Non-Erase Suspended Sector | Data | | | | | | 1 |
| | Erase-Suspend-Program (Embedded Program) | | DQ7# | Toggle | 0 | N/A | N/A | N/A | 0 |
| Write-to-Buffer | Busy (Note 3) | | DQ7# | Toggle | 0 | N/A | N/A | 0 | 0 |
| | Abort (Note 4) | | DQ7# | Toggle | 0 | N/A | N/A | 1 | 0 |

Notes:

1. DQ5 switches to 1 when an Embedded Program, Embedded Erase, or Write-to-Buffer operation has exceeded the maximum timing limits. Refer to the section on DQ5 for more information.
2. DQ7 and DQ2 require a valid address when reading status information. Refer to the appropriate subsection for further details.
3. The Data# Polling algorithm should be used to monitor the last loaded write-buffer address location.
4. DQ1 switches to 1 when the device has aborted the write-to-buffer operation

Absolute Maximum Ratings

| | |
|--|---------------------------|
| Storage Temperature, Plastic Packages | -65°C to +150°C |
| Ambient Temperature with Power Applied | -65°C to +125°C |
| Voltage with Respect to Ground: | |
| V_{CC} (Note 1) | -0.5 V to +4.0 V |
| V_{IO} | -0.5 V to +4.0 V |
| A9, OE#, and ACC (Note 2) | -0.5 V to +12.5 V |
| All other pins (Note 1) | -0.5 V to $V_{CC} + 0.5V$ |
| Output Short Circuit Current (Note 3) | 200 mA |

Notes:

1. Minimum DC voltage on input or I/Os is -0.5 V. During voltage transitions, inputs or I/Os may overshoot V_{SS} to -2.0 V for periods of up to 20 ns. See Figure 7, on page 73. Maximum DC voltage on input or I/Os is $V_{CC} + 0.5 V$. During voltage transitions, input or I/O pins may overshoot to $V_{CC} + 2.0 V$ for periods up to 20 ns. See Figure 8, on page 73.
2. Minimum DC input voltage on pins A9, OE#, and ACC is -0.5 V. During voltage transitions, A9, OE#, and ACC may overshoot V_{SS} to -2.0 V for periods of up to 20 ns. See Figure 7, on page 73. Maximum DC input voltage on pin A9, OE#, and ACC is +12.5 V which may overshoot to +14.0V for periods up to 20 ns.
3. No more than one output may be shorted to ground at a time. Duration of the short circuit should not be greater than one second.
4. Stresses above those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational sections of this data sheet is not implied. Exposure of the device to absolute maximum rating conditions for extended periods may affect device reliability.

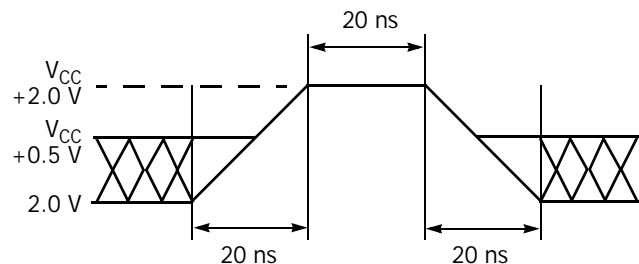
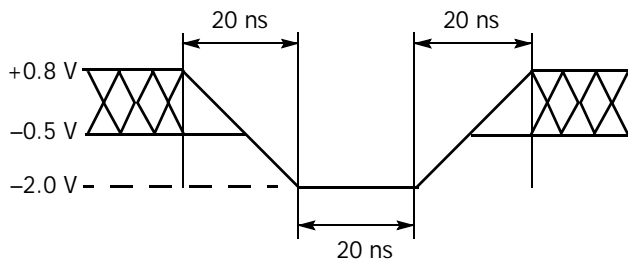


Figure 7. Maximum Negative Overshoot Waveform

Figure 8. Maximum Positive Overshoot Waveform

Operating Ranges

Industrial (I) Devices

| | |
|---|----------------|
| Ambient Temperature (T_A) | -40°C to +85°C |
|---|----------------|

Supply Voltages

| | |
|-----------------------------|-------------------------------------|
| V_{CC} | +2.7 V to +3.6 V or +3.0 V to 3.6 V |
| V_{IO} (Note 2) | +1.65 V to 1.95 V or V_{CC} |

Notes:

1. Operating ranges define those limits between which the functionality of the device is guaranteed.
2. See *Product Selector Guide*, on page 6.

DC Characteristics

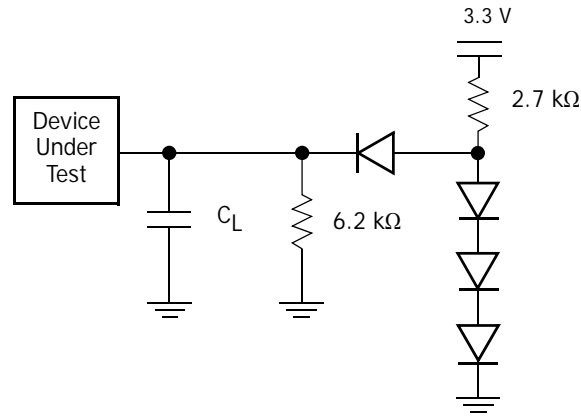
CMOS Compatible

| Parameter Symbol | Parameter Description (Notes) | Test Conditions | Min | Typ | Max | Unit |
|------------------|---|--|------------------------|-----|------------------------|------|
| I _{LI} | Input Load Current (1) | V _{IN} = V _{SS} to V _{CC} , V _{CC} = V _{CC max} | | | WP/ACC: ±2.0 | µA |
| | | | | | Others: ±1.0 | |
| I _{LIT} | A9 Input Load Current | V _{CC} = V _{CC max} ; A9 = 12.5 V | | | 35 | µA |
| I _{LO} | Output Leakage Current | V _{OUT} = V _{SS} to V _{CC} , V _{CC} = V _{CC max} | | | ±1.0 | µA |
| I _{CC1} | V _{CC} Active Read Current (1) | CE# = V _{IL} ; OE# = V _{IH} , V _{CC} = V _{CCmax} ; f = 1 MHz, Byte Mode | | 6 | 20 | mA |
| | | CE# = V _{IL} ; OE# = V _{IH} , V _{CC} = V _{CCmax} ; f = 5 MHz, Word Mode | | 30 | 50 | |
| | | CE# = V _{IL} ; OE# = V _{IH} , V _{CC} = V _{CCmax} ; f = 10 MHz | | 60 | 90 | |
| I _{CC2} | V _{CC} Intra-Page Read Current (1) | CE# = V _{IL} ; OE# = V _{IH} , V _{CC} = V _{CCmax} ; f = 10 MHz | | 1 | 10 | mA |
| | | CE# = V _{IL} ; OE# = V _{IH} , V _{CC} = V _{CCmax} ; f = 33 MHz | | 5 | 20 | |
| I _{CC3} | V _{CC} Active Erase/Program Current (2, 3) | CE# = V _{IL} , OE# = V _{IH} , V _{CC} = V _{CCmax} | | 50 | 90 | mA |
| I _{CC4} | V _{CC} Standby Current | V _{CC} = V _{CCmax} ; V _{IO} = V _{CC} ; OE# = V _{IH} ; V _{IL} = V _{SS} + 0.3 V / -0.1 V; CE#, RESET# = V _{CC} ± 0.3 V | | 1 | 5 | µA |
| I _{CC5} | V _{CC} Reset Current | V _{CC} = V _{CCmax} ; V _{IO} = V _{CC} ; V _{IL} = V _{SS} + 0.3 V / -0.1 V; RESET# = V _{SS} ± 0.3 V | | 1 | 5 | µA |
| I _{CC6} | Automatic Sleep Mode (4) | V _{CC} = V _{CCmax} ; V _{IO} = V _{CC} ; V _{IH} = V _{CC} ± 0.3 V; V _{IL} = V _{SS} + 0.3 V / -0.1 V; WP#/ACC = V _{IH} | | 1 | 5 | µA |
| I _{ACC} | ACC Accelerated Program Current | CE# = V _{IL} , OE# = V _{IH} , V _{CC} = V _{CCmax} , WP#/ACC = V _{IH} | WP#/ACC pin | 10 | 20 | mA |
| | | | V _{CC} pin | 50 | 90 | |
| V _{IL} | Input Low Voltage (5) | | -0.1 | | 0.3 x V _{IO} | V |
| V _{IH} | Input High Voltage (5) | | 0.7 x V _{IO} | | V _{IO} + 0.3 | V |
| V _{HH} | Voltage for ACC Erase/Program Acceleration | V _{CC} = 2.7–3.6 V | 11.5 | | 12.5 | V |
| V _{ID} | Voltage for Autoselect and Temporary Sector Unprotect | V _{CC} = 2.7–3.6 V | 11.5 | | 12.5 | V |
| V _{OL} | Output Low Voltage (5) | I _{OL} = 100 µA | | | 0.15 x V _{IO} | V |
| V _{OH} | Output High Voltage (5) | I _{OH} = -100 µA | 0.85 x V _{IO} | | | V |
| V _{LKO} | Low V _{CC} Lock-Out Voltage (3) | | 2.3 | | 2.5 | V |

Notes:

1. The I_{CC} current listed is typically less than 2 mA/MHz, with OE# at V_{IH}.
2. I_{CC} active while Embedded Erase or Embedded Program or Write Buffer Programming is in progress.
3. Not 100% tested.
4. Automatic sleep mode enables the lower power mode when addresses remain stable for t_{ACC} + 30 ns.
5. V_{IO} = 1.65–1.95 V or 2.7–3.6 V
6. V_{CC} = 3 V and V_{IO} = 3V or 1.8V. When V_{IO} is at 1.8V, I/O pins cannot operate at 3V.

Test Conditions



Note: Diodes are IN3064 or equivalent

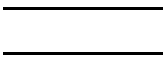
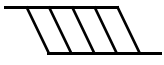

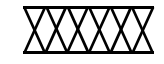
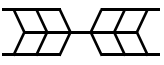
Figure 9. Test Setup

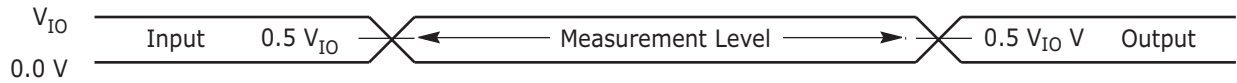
Table 17. Test Specifications

| Test Condition | All Speeds | Unit |
|---|--------------|------|
| Output Load | 1 TTL gate | |
| Output Load Capacitance, C_L (including jig capacitance) | 30 | pF |
| Input Rise and Fall Times | 5 | ns |
| Input Pulse Levels | $0.0-V_{IO}$ | V |
| Input timing measurement reference levels (See Note) | $0.5V_{IO}$ | V |
| Output timing measurement reference levels | $0.5 V_{IO}$ | V |

Note: If $V_{IO} < V_{CC}$, the reference level is $0.5 V_{IO}$.

Key to Switching Waveforms

| Waveform | Inputs | Outputs |
|---|----------------------------------|--|
|  | | Steady |
|  | | Changing from H to L |
|  | | Changing from L to H |
|  | Don't Care, Any Change Permitted | Changing, State Unknown |
|  | Does Not Apply | Center Line is High Impedance State (High Z) |



Note: If $V_{IO} < V_{CC}$, the input measurement reference level is $0.5 V_{IO}$.

Figure 10. Input Waveforms and Measurement Levels

AC Characteristics

Read-Only Operations

| Parameter | | Description | Test Setup | Speed Options | | | | Unit | |
|------------|------------|---|--|----------------|-----|-----|-----|------|----|
| JEDEC | Std. | | | 90 (Note 6) | 100 | 110 | 110 | | |
| t_{AVAV} | t_{RC} | Read Cycle Time | $V_{IO} = V_{CC} = 3\text{ V}$ | Min | 90 | 100 | 110 | ns | |
| | | | $V_{IO} = 1.8\text{ V}, V_{CC} = 3\text{ V}$ | | | | 110 | | |
| t_{AVQV} | t_{ACC} | Address to Output Delay (Note 2) | $V_{IO} = V_{CC} = 3\text{ V}$ | Max | 90 | 100 | 110 | ns | |
| | | | $V_{IO} = 1.8\text{ V}, V_{CC} = 3\text{ V}$ | | | | 110 | | |
| t_{ELOV} | t_{CE} | Chip Enable to Output Delay (Note 3) | $V_{IO} = V_{CC} = 3\text{ V}$ | Max | 90 | 100 | 110 | ns | |
| | | | $V_{IO} = 1.8\text{ V}, V_{CC} = 3\text{ V}$ | | | | 110 | | |
| | t_{PACC} | Page Access Time | | Max | 25 | 25 | 25 | 30 | ns |
| t_{GLOV} | t_{OE} | Output Enable to Output Delay | | Max | 25 | 25 | 35 | 35 | ns |
| t_{EHQZ} | t_{DF} | Chip Enable to Output High Z (Note 1) | | Max | 20 | | | ns | |
| t_{GHQZ} | t_{DF} | Output Enable to Output High Z (Note 1) | | Max | 20 | | | ns | |
| t_{AXQX} | t_{OH} | Output Hold Time From Addresses, CE# or OE#, Whichever Occurs First | | Min | 0 | | | ns | |
| | t_{OEH} | Output Enable Hold Time (Note 1) | Read | Min | 0 | | | ns | |
| | | | Toggle and Data# Polling | Min | 10 | | | ns | |
| | t_{CEH} | Chip Enable Hold Time | Read | Min | 35 | | | ns | |

Notes:

- Not 100% tested.
- $CE\#, OE\# = V_{IL}$
- $OE\# = V_{IL}$
- See Figure 9, on page 75 and Table 17 on page 75 for test specifications.
- Unless otherwise indicated, AC specifications for 90 ns, 100 ns, and 110 ns speed options are tested with $V_{IO} = V_{CC} = 3\text{ V}$. AC specifications for 110 ns speed options are tested with $V_{IO} = 1.8\text{ V}$ and $V_{CC} = 3.0\text{ V}$.
- 90 ns speed option only applicable to S29GL128N and S29GL256N.

AC Characteristics

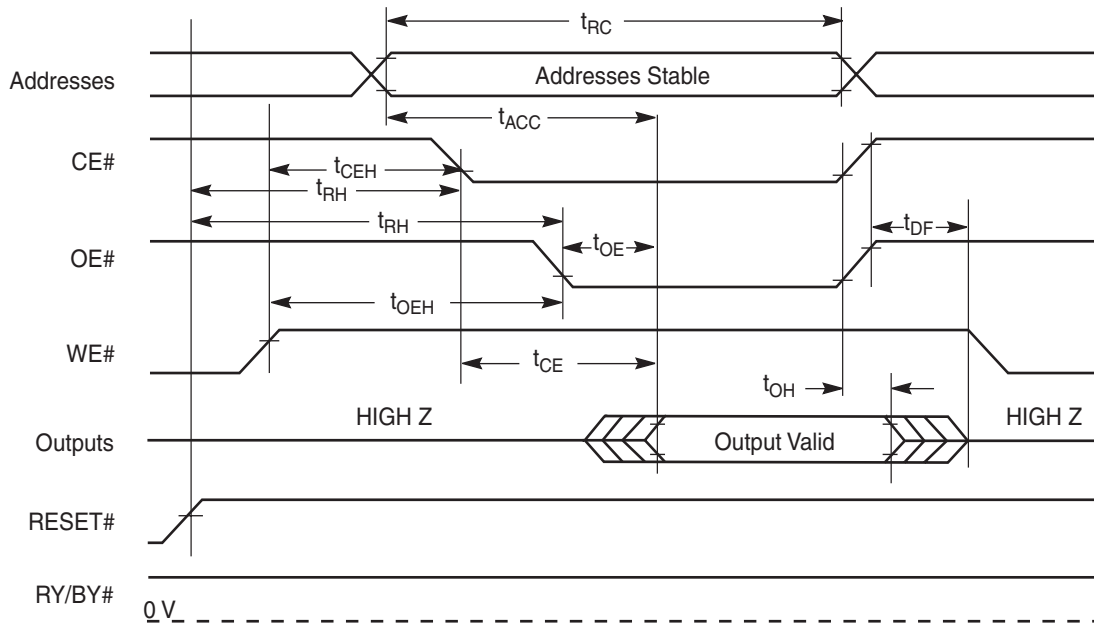
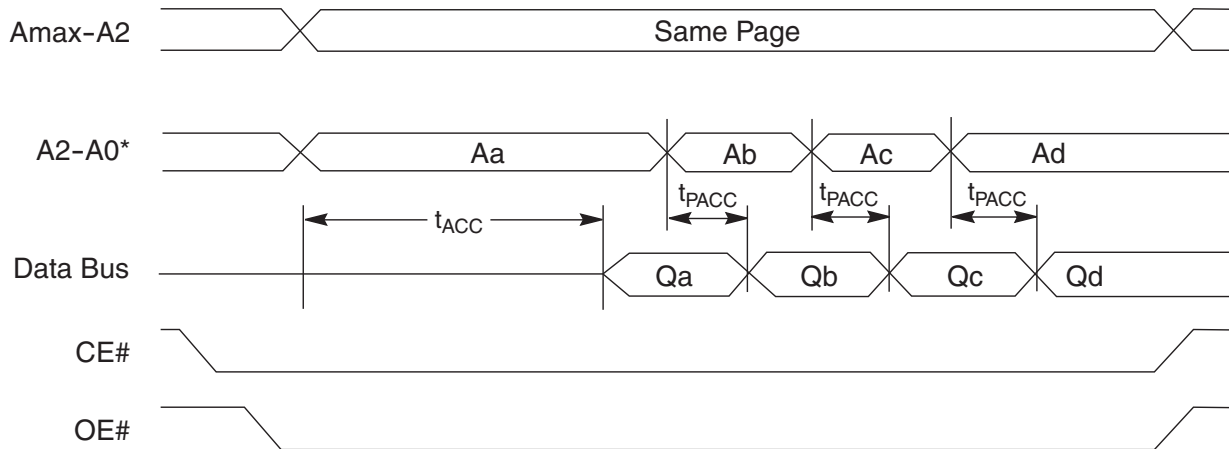


Figure II. Read Operation Timings



* Figure shows word mode. Addresses are A2-A-1 for byte mode.

Figure I2. Page Read Timings

AC Characteristics

Hardware Reset (RESET#)

| Parameter | | Description | | Speed (Note 2) | Unit |
|-----------|-------------|---|-----|----------------|---------|
| JEDEC | Std. | | | | |
| | t_{Ready} | RESET# Pin Low (During Embedded Algorithms) to Read Mode (Note 1) | Max | 20 | ns |
| | t_{Ready} | RESET# Pin Low (NOT During Embedded Algorithms) to Read Mode (Note 1) | Max | 500 | ns |
| | t_{RP} | RESET# Pulse Width | Min | 500 | ns |
| | t_{RH} | Reset High Time Before Read (Note 1) | Min | 50 | ns |
| | t_{RPD} | RESET# Low to Standby Mode | Min | 20 | μ s |
| | t_{RB} | RY/BY# Recovery Time | Min | 0 | ns |

Notes:

1. Not 100% tested. If ramp rate is equal to or faster than 1V/100 μ s with a falling edge of the RESET# pin initiated, the RESET# pin needs to be held low only for 100 μ s for power-up.
2. Next generation devices may have different reset speeds. To increase system design considerations, please refer to the "Advance Information on S29GL-P Hardware Reset (RESET#) and Power-up Sequence" section for advance reset speeds on S29GL-P devices.

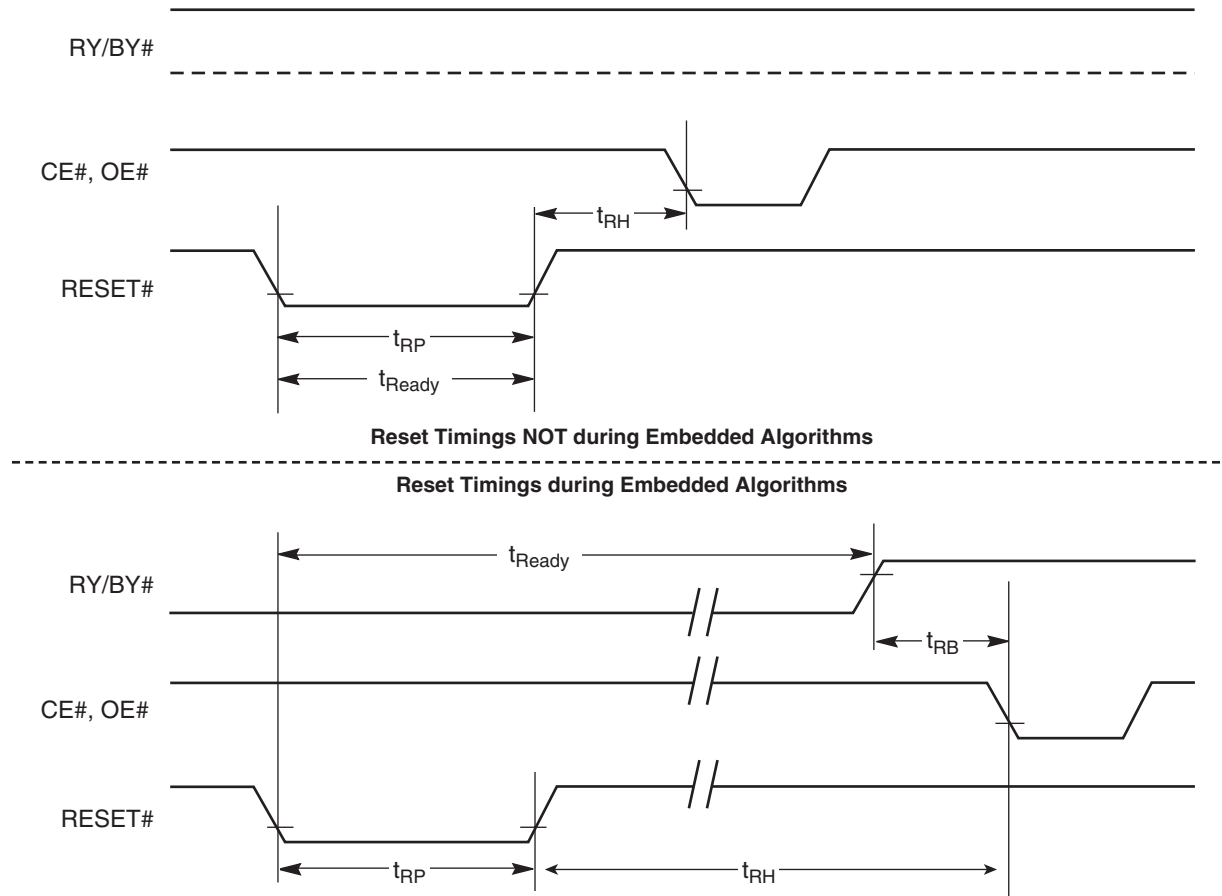


Figure I3. Reset Timings

AC Characteristics

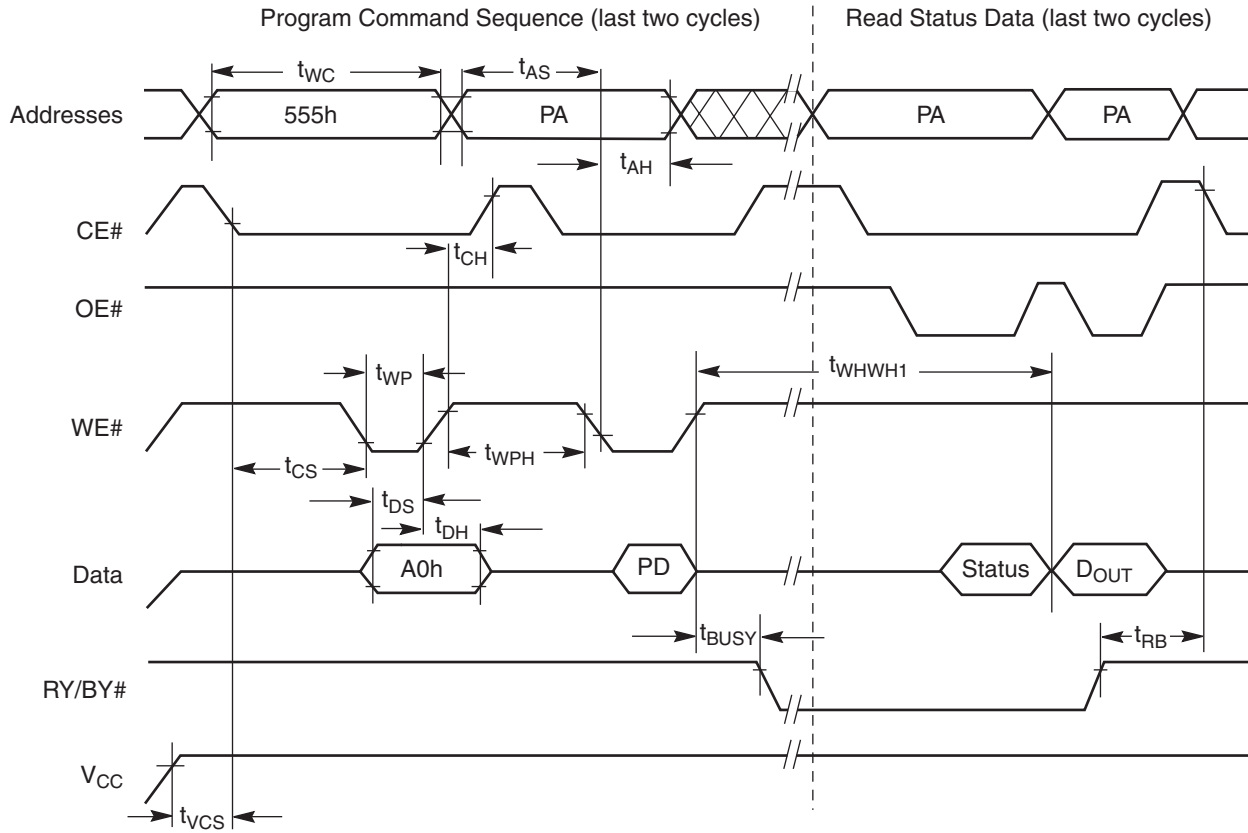
Erase and Program Operations

| Parameter | | Description | | Speed Options | | | | Unit | |
|--------------------|--------------------|---|----------|----------------|------|-----|-----|------|----|
| JEDEC | Std. | | | 90 (Note 6) | 100 | 110 | 110 | | |
| t _{AVAV} | t _{WC} | Write Cycle Time (Note 1) | Min | 90 | 100 | 110 | 110 | ns | |
| t _{AVWL} | t _{AS} | Address Setup Time | Min | 0 | | | | ns | |
| | t _{ASO} | Address Setup Time to OE# low during toggle bit polling | Min | 15 | | | | ns | |
| t _{WLAX} | t _{AH} | Address Hold Time | Min | 45 | | | | ns | |
| | t _{AHT} | Address Hold Time From CE# or OE# high during toggle bit polling | Min | 0 | | | | ns | |
| t _{DVWH} | t _{DS} | Data Setup Time | Min | 45 | | | | ns | |
| t _{WHDX} | t _{DH} | Data Hold Time | Min | 0 | | | | ns | |
| | t _{CEPH} | CE# High during toggle bit polling | Min | 20 | | | | | |
| | t _{OEPH} | Output Enable High during toggle bit polling | Min | 20 | | | | ns | |
| t _{GHWL} | t _{GHWL} | Read Recovery Time Before Write (OE# High to WE# Low) | Min | 0 | | | | ns | |
| t _{ELWL} | t _{CS} | CE# Setup Time | Min | 0 | | | | ns | |
| t _{WHEH} | t _{CH} | CE# Hold Time | Min | 0 | | | | ns | |
| t _{WLWH} | t _{WP} | Write Pulse Width | Min | 35 | | | | ns | |
| t _{WHDL} | t _{WPH} | Write Pulse Width High | Min | 30 | | | | ns | |
| t _{WHWH1} | t _{WHWH1} | Write Buffer Program Operation (Notes 2, 3) | Typ | 240 | | | | μs | |
| | | Effective Write Buffer Program Operation (Notes 2, 4) | Per Word | Typ | 15 | | | | μs |
| | | Accelerated Effective Write Buffer Program Operation (Notes 2, 4) | Per Word | Typ | 13.5 | | | | μs |
| | | Program Operation (Note 2) | Word | Typ | 60 | | | | μs |
| | | Accelerated Programming Operation (Note 2) | Word | Typ | 54 | | | | μs |
| t _{WHWH2} | t _{WHWH2} | Sector Erase Operation (Note 2) | Typ | 0.5 | | | | sec | |
| | t _{VHH} | V _{HH} Rise and Fall Time (Note 1) | Min | 250 | | | | ns | |
| | t _{VCS} | V _{CC} Setup Time (Note 1) | Min | 50 | | | | μs | |
| | t _{BUSY} | Erase/Program Valid to RY/BY# Delay | Max | 90 | | | | ns | |

Notes:

1. Not 100% tested.
2. See the [Erase And Programming Performance, on page 87](#) for more information.
3. For 1–16 words/1–32 bytes programmed.
4. Effective write buffer specification is based upon a 16-word/32-byte write buffer operation.
5. Unless otherwise indicated, AC specifications for 90 ns, 100 ns, and 110 ns speed options are tested with V_{IO} = V_{CC} = 3 V. AC specifications for 110 ns speed options are tested with V_{IO} = 1.8 V and V_{CC} = 3.0 V.
6. 90 ns speed option only applicable to S29GL128N and S29GL256N.

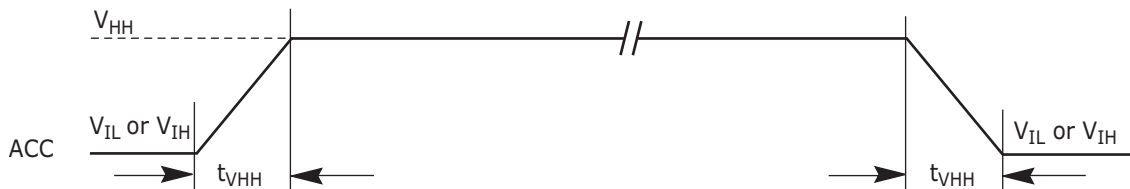
AC Characteristics



Notes:

1. PA = program address, PD = program data, D_{OUT} is the true data at the program address.
2. Illustration shows device in word mode.

Figure I4. Program Operation Timings

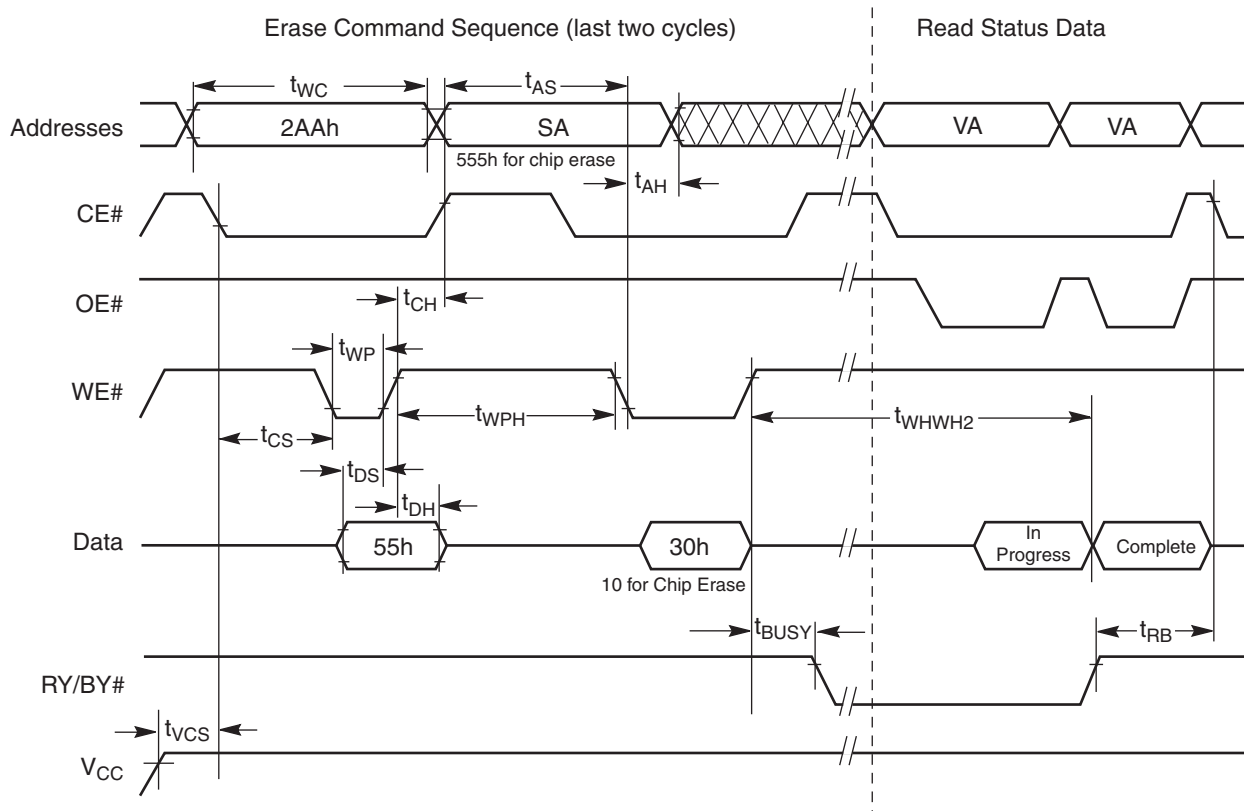


Notes:

1. Not 100% tested.
2. CE#, OE# = V_{IL}
3. OE# = V_{IL}
4. See Figure 9, on page 75 and Table 17 on page 75 for test specifications.

Figure I5. Accelerated Program Timing Diagram

AC Characteristics

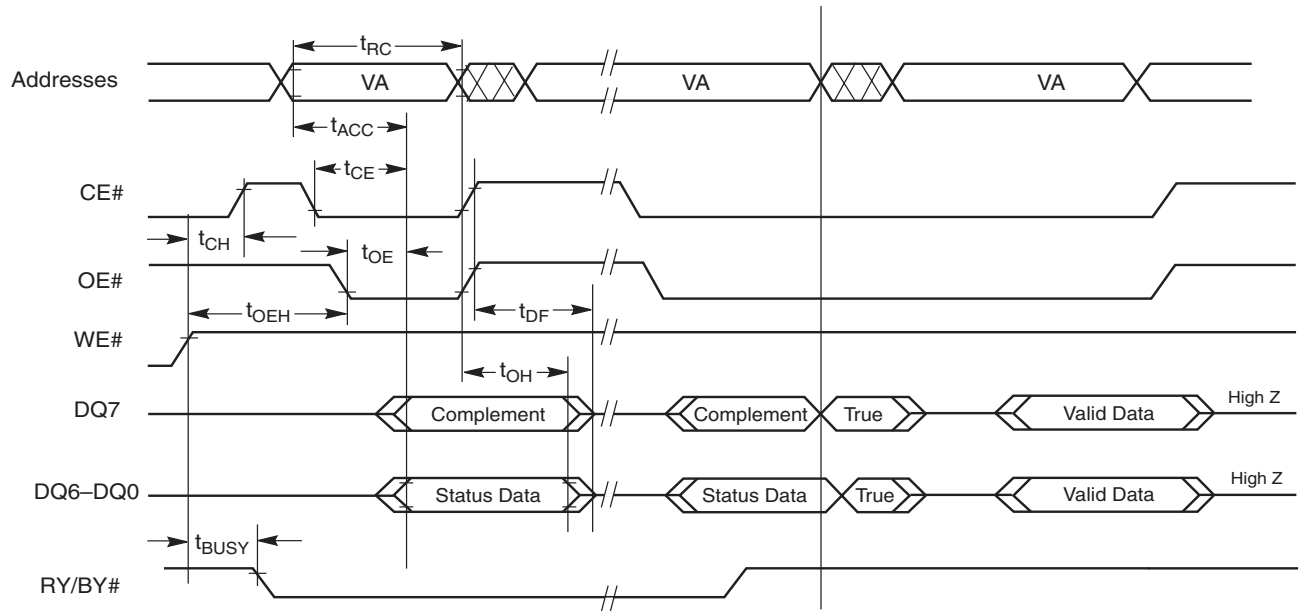


Notes:

1. SA = sector address (for Sector Erase), VA = Valid Address for reading status data (see [Write Operation Status, on page 67](#)).
2. These waveforms are for the word mode.

Figure 16. Chip/Sector Erase Operation Timings

AC Characteristics

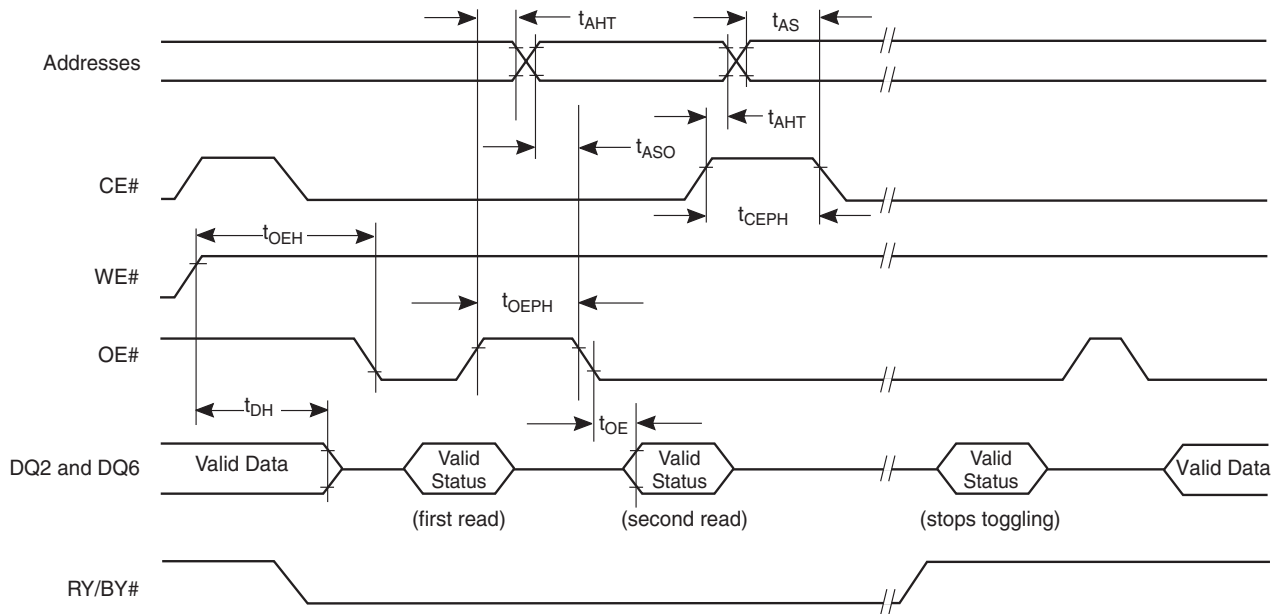


Note:

1. VA = Valid address. Illustration shows first status cycle after command sequence, last status read cycle, and array data read cycle.
2. t_{OE} for data polling is 45 ns when $V_{IO} = 1.65$ to 2.7 V and is 35 ns when $V_{IO} = 2.7$ to 3.6 V

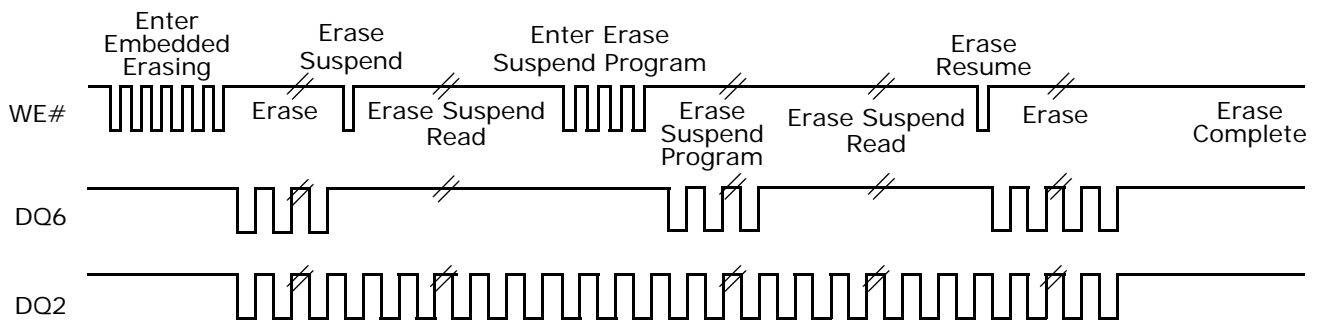
Figure 17. Data# Polling Timings (During Embedded Algorithms)

AC Characteristics



Note: VA = Valid address; not required for DQ6. Illustration shows first two status cycle after command sequence, last status read cycle, and array data read cycle

Figure 18. Toggle Bit Timings (During Embedded Algorithms)



Note: DQ2 toggles only when read at an address within an erase-suspended sector. The system may use OE# or CE# to toggle DQ2 and DQ6.

Figure 19. DQ2 vs. DQ6

AC Characteristics

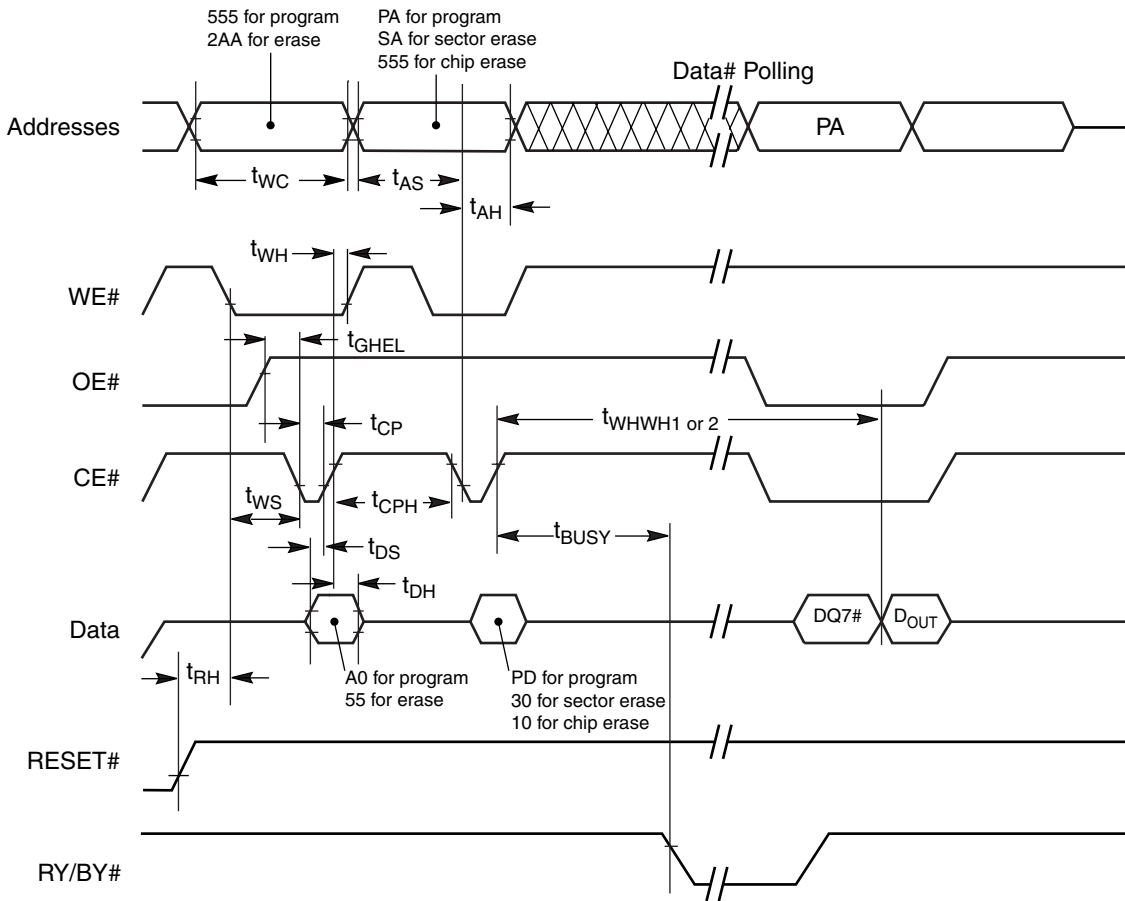
Alternate CE# Controlled Erase and Program Operations- S29GL128N, S29GL256N, S29GL512N

| Parameter | | Description | | Speed Options | | | | Unit | |
|--------------------|--------------------|---|----------|----------------|------|-----|-----|------|----|
| JEDEC | Std. | | | 90 (Note 6) | 100 | 110 | 110 | | |
| t _{AVAV} | t _{WC} | Write Cycle Time (Note 1) | Min | 90 | 100 | 110 | 110 | ns | |
| t _{AVWL} | t _{AS} | Address Setup Time | Min | 0 | | | | ns | |
| | T _{ASO} | Address Setup Time to OE# low during toggle bit polling | Min | 15 | | | | ns | |
| t _{ELAX} | t _{AH} | Address Hold Time | Min | 45 | | | | ns | |
| | t _{AHT} | Address Hold Time From CE# or OE# high during toggle bit polling | Min | 0 | | | | ns | |
| t _{DVEH} | t _{DS} | Data Setup Time | Min | 45 | | | | ns | |
| t _{EHDx} | t _{DH} | Data Hold Time | Min | 0 | | | | ns | |
| | t _{CEPH} | CE# High during toggle bit polling | Min | 20 | | | | ns | |
| | t _{OEPH} | OE# High during toggle bit polling | Min | 20 | | | | ns | |
| t _{GHEL} | t _{GHEL} | Read Recovery Time Before Write (OE# High to WE# Low) | Min | 0 | | | | ns | |
| t _{WLEL} | t _{WS} | WE# Setup Time | Min | 0 | | | | ns | |
| t _{EHWH} | t _{WH} | WE# Hold Time | Min | 0 | | | | ns | |
| t _{ELEH} | t _{CP} | CE# Pulse Width | Min | 35 | | | | ns | |
| t _{EHEL} | t _{CPH} | CE# Pulse Width High | Min | 30 | | | | ns | |
| t _{WHWH1} | t _{WHWH1} | Write Buffer Program Operation (Notes 2, 3) | Typ | 240 | | | | μs | |
| | | Effective Write Buffer Program Operation (Notes 2, 4) | Per Word | Typ | 15 | | | | μs |
| | | Effective Accelerated Write Buffer Program Operation (Notes 2, 4) | Per Word | Typ | 13.5 | | | | μs |
| | | Program Operation (Note 2) | Word | Typ | 60 | | | | μs |
| | | Accelerated Programming Operation (Note 2) | Word | Typ | 54 | | | | μs |
| t _{WHWH2} | t _{WHWH2} | Sector Erase Operation (Note 2) | Typ | 0.5 | | | | sec | |

Notes:

- Not 100% tested.
- See [AC Characteristics, on page 77](#) for more information.
- For 1–16 words/1–32 bytes programmed.
- Effective write buffer specification is based upon a 16-word/32-byte write buffer operation.
- Unless otherwise indicated, AC specifications for 90 ns, 100ns, and 110 ns speed options are tested with $V_{IO} = V_{CC} = 3\text{ V}$. AC specifications for 110 ns speed options are tested with $V_{IO} = 1.8\text{ V}$ and $V_{CC} = 3.0\text{ V}$.
- 90 ns speed option only applicable to S29GL128N and S29GL256N.

AC Characteristics



Notes:

1. Figure indicates last two bus cycles of a program or erase operation.
2. PA = program address, SA = sector address, PD = program data.
3. DQ7# is the complement of the data written to the device. D_{OUT} is the data written to the device.

Figure 20. Alternate CE# Controlled Write (Erase/Program) Operation Timings

Erase And Programming Performance

| Parameter | | Typ (Note 1) | Max (Note 2) | Unit | Comments |
|--|-----------|-----------------|-----------------|------|--|
| Sector Erase Time | | 0.5 | 3.5 | sec | Excludes 00h programming prior to erasure (Note 5) |
| Chip Erase Time | S29GL128N | 64 | 256 | sec | |
| | S29GL256N | 128 | 512 | | |
| | S29GL512N | 256 | 1024 | | |
| Total Write Buffer Programming Time (Note 3) | | 240 | | µs | Excludes system level overhead (Note 6) |
| Total Accelerated Effective Write Buffer Programming Time (Note 3) | | 200 | | µs | |
| Chip Program Time (Note 4) | S29GL128N | 123 | | sec | |
| | S29GL256N | 246 | | | |
| | S29GL512N | 492 | | | |

Notes:

1. Typical program and erase times assume the following conditions: 25°C, 3.0 V V_{CC} , 10,000 cycles, checkerboard pattern.
2. Under worst case conditions of 90°C, $V_{CC} = 3.0$ V, 100,000 cycles.
3. Effective write buffer specification is based upon a 16-word write buffer operation.
4. The typical chip programming time is considerably less than the maximum chip programming time listed, since most words program faster than the maximum program times listed.
5. In the pre-programming step of the Embedded Erase algorithm, all bits are programmed to 00h before erasure.
6. System-level overhead is the time required to execute the two- or four-bus-cycle sequence for the program command. See [Table 12 on page 63](#) and [Table 14 on page 65](#) for further information on command definitions.

TSOP Pin and BGA Package Capacitance

| Parameter Symbol | Parameter Description | Test Setup | | Typ | Max | Unit |
|------------------|-------------------------|---------------|------|-----|-----|------|
| C_{IN} | Input Capacitance | $V_{IN} = 0$ | TSOP | 6 | 7.5 | pF |
| | | | BGA | 4.2 | 5.0 | pF |
| C_{OUT} | Output Capacitance | $V_{OUT} = 0$ | TSOP | 8.5 | 12 | pF |
| | | | BGA | 5.4 | 6.5 | pF |
| C_{IN2} | Control Pin Capacitance | $V_{IN} = 0$ | TSOP | 7.5 | 9 | pF |
| | | | BGA | 3.9 | 4.7 | pF |

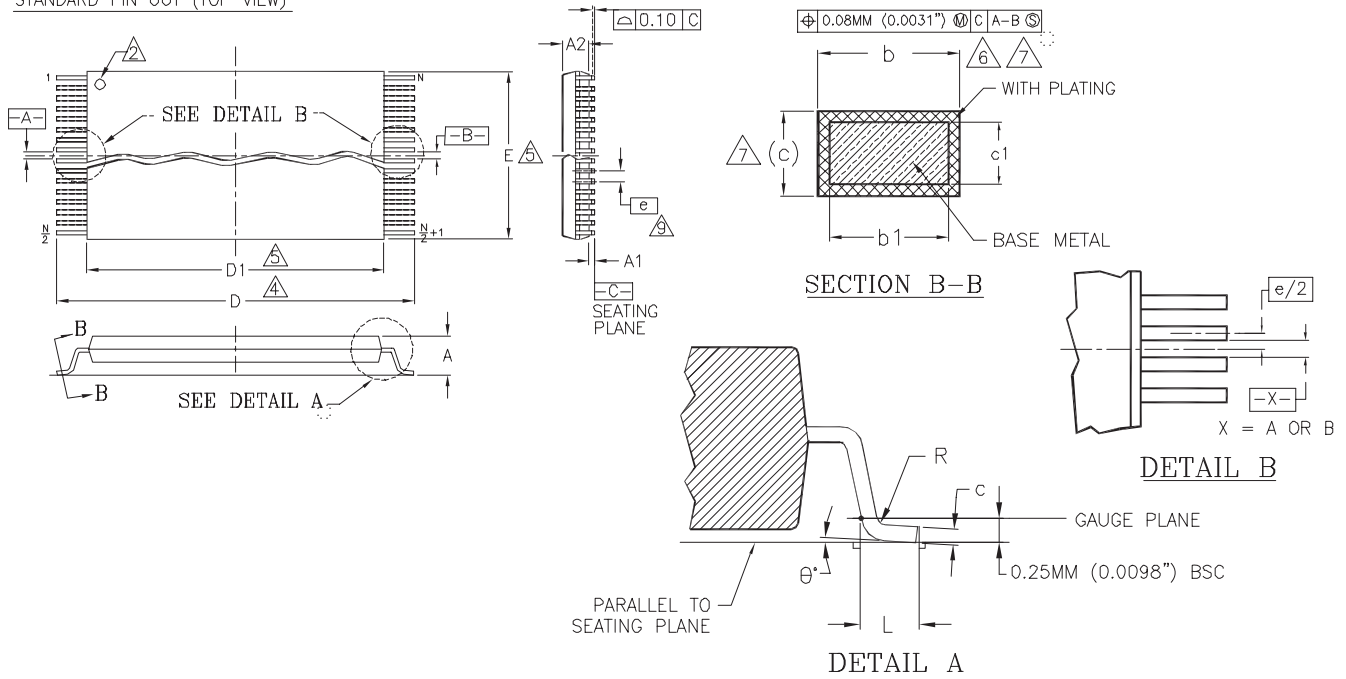
Notes:

1. Sampled, not 100% tested.
2. Test conditions $T_A = 25^\circ\text{C}$, $f = 1.0$ MHz.

Physical Dimensions

TS056—56-Pin Standard Thin Small Outline Package (TSOP)

STANDARD PIN OUT (TOP VIEW)



| PACKAGE | TS 56 | | |
|---------|---------------|-------|-------|
| JEDEC | MO-142 (B) EC | | |
| SYMBOL | MIN. | NOM. | MAX. |
| A | --- | --- | 1.20 |
| A1 | 0.05 | --- | 0.15 |
| A2 | 0.95 | 1.00 | 1.05 |
| b1 | 0.17 | 0.20 | 0.23 |
| b | 0.17 | 0.22 | 0.27 |
| c1 | 0.10 | --- | 0.16 |
| c | 0.10 | --- | 0.21 |
| D | 19.80 | 20.00 | 20.20 |
| D1 | 18.30 | 18.40 | 18.50 |
| E | 13.90 | 14.00 | 14.10 |
| e | 0.50 BASIC | | |
| L | 0.50 | 0.60 | 0.70 |
| ∅ | 0° | - | 8° |
| R | 0.08 | --- | 0.20 |
| N | 56 | | |

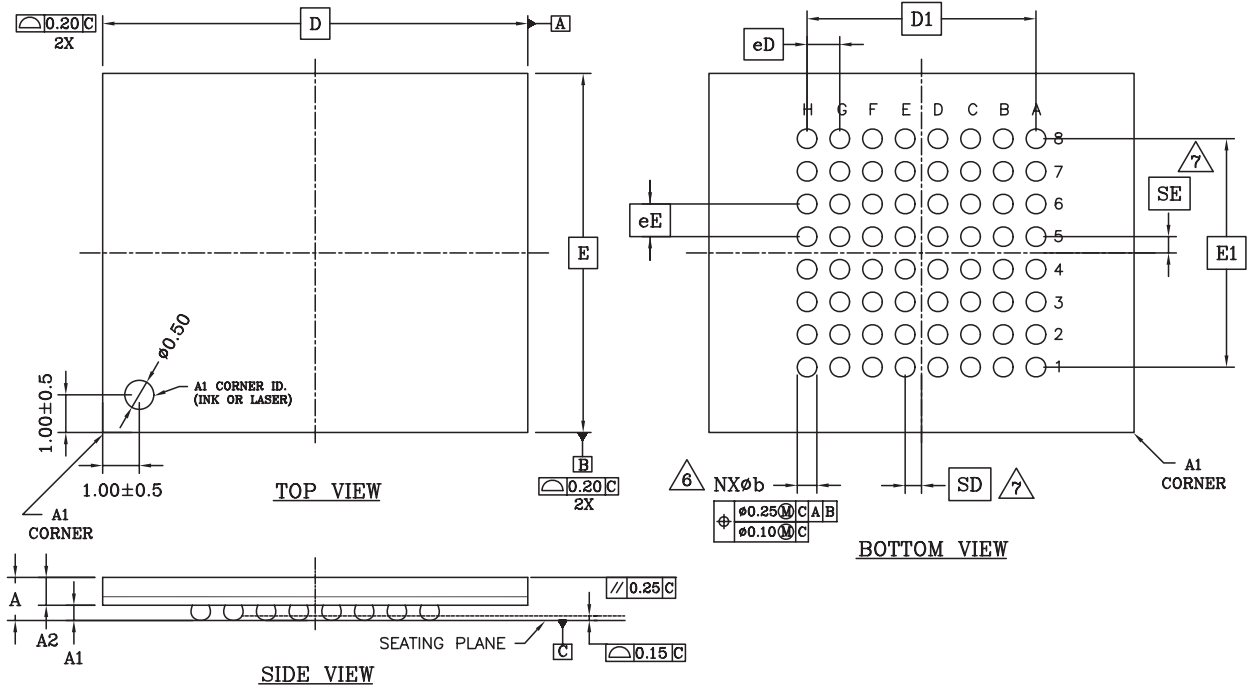
NOTES:

- 1 CONTROLLING DIMENSIONS ARE IN MILLIMETERS (mm). (DIMENSIONING AND TOLERANCING CONFORMS TO ANSI Y14.5M-1982.)
- 2 PIN 1 IDENTIFIER FOR STANDARD PIN OUT (DIE UP).
- 3 TO BE DETERMINED AT THE SEATING PLANE -C-. THE SEATING PLANE IS DEFINED AS THE PLANE OF CONTACT THAT IS MADE WHEN THE PACKAGE LEADS ARE ALLOWED TO REST FREELY ON A FLAT HORIZONTAL SURFACE.
- 4 DIMENSIONS D1 AND E DO NOT INCLUDE MOLD PROTUSION. ALLOWABLE MOLD PROTUSION IS 0.15 mm PER SIDE.
- 5 DIMENSION b DOES NOT INCLUDE DAMBAR PROTUSION. ALLOWABLE DAMBAR PROTUSION SHALL BE 0.08 mm TOTAL IN EXCESS OF b DIMENSION AT MAX MATERIAL CONDITION. MINIMUM SPACE BETWEEN PROTUSION AND AN ADJACENT LEAD TO BE 0.07 mm.
- 6 THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 mm AND 0.25 mm FROM THE LEAD TIP.
- 7 LEAD COPLANARITY SHALL BE WITHIN 0.10 mm AS MEASURED FROM THE SEATING PLANE.
- 8 DIMENSION "e" IS MEASURED AT THE CENTERLINE OF THE LEADS.

3160/38.10A

Physical Dimensions

LAA064—64-Ball Fortified Ball Grid Array (FBGA)



| PACKAGE | LAA 064 | | | |
|---------|------------------------|------|------|--------------------------|
| JEDEC | N/A | | | |
| | 13.00x11.00 mm PACKAGE | | | |
| SYMBOL | MIN. | NOM. | MAX. | NOTE |
| A | — | — | 1.40 | PROFILE HEIGHT |
| A1 | 0.40 | — | — | STANDOFF |
| A2 | 0.60 | — | — | BODY THICKNESS |
| D | 13.00 BSC. | | | BODY SIZE |
| E | 11.00 BSC. | | | BODY SIZE |
| D1 | 7.00 BSC. | | | MATRIX FOOTPRINT |
| E1 | 7.00 BSC. | | | MATRIX FOOTPRINT |
| MD | 8 | | | MATRIX SIZE D DIRECTION |
| ME | 8 | | | MATRIX SIZE E DIRECTION |
| N | 64 | | | BALL COUNT |
| øb | 0.50 | 0.60 | 0.70 | BALL DIAMETER |
| eD | 1.00 BSC. | | | BALL PITCH - D DIRECTION |
| eE | 1.00 BSC. | | | BALL PITCH - E DIRECTION |
| SD/SE | 0.50 BSC. | | | SOLDER BALL PLACEMENT |

NOTES:

- DIMENSIONING AND TOLERANCING METHODS PER ASME Y14.5M-1994 .
- ALL DIMENSIONS ARE IN MILLIMETERS .
- BALL POSITION DESIGNATION PER JESD 95-1, SPP-010 (EXCEPT AS NOTED).
- REPRESENTS THE SOLDER BALL GRID PITCH .
- SYMBOL "MD" IS THE BALL MATRIX SIZE IN THE "D" DIRECTION.
SYMBOL "ME" IS THE BALL COLUMN MATRIX SIZE IN THE "E" DIRECTION.
N IS THE NUMBER OF POPULATED SOLDER BALL POSITIONS FOR MATRIX SIZE MD X ME.
- △6 DIMENSION "b" IS MEASURED AT THE MAXIMUM BALL DIAMETER IN A PLANE PARALLEL TO DATUM "c".
- △7 SD AND SE ARE MEASURED WITH RESPECT TO DATUMS A AND B AND DEFINE THE POSITION OF THE CENTER SOLDER BALL IN THE OUTER ROW.
WHEN THERE IS AN ODD NUMBER OF SOLDER BALLS IN THE OUTER ROW, SD OR SE = 0.000.
WHEN THERE IS AN EVEN NUMBER OF SOLDER BALLS IN THE OUTER ROW, SD OR SE = $\frac{e}{2}$
- "X" IN THE PACKAGE VARIATIONS DENOTES PART IS UNDER QUALIFICATION.
- "+" INDICATES THE THEORETICAL CENTER OF DEPOPULATED BALLS.

Advance Information on S29GL-P Hardware Reset (RESET#) and Power-up Sequence

Table 18. Hardware Reset (RESET#)

| Parameter | | Description | | Speed | Unit |
|-----------|-------------|--|-----|-------|---------|
| JEDEC | Std. | | | | |
| | t_{Ready} | RESET# Pin Low (During Embedded Algorithms) to Read Mode or Write mode | Min | 35 | μ s |
| | t_{Ready} | RESET# Pin Low (NOT During Embedded Algorithms) to Read Mode or Write mode | Min | 35 | μ s |
| | t_{RP} | RESET# Pulse Width | Min | 35 | μ s |
| | t_{RH} | Reset High Time Before Read | Min | 200 | ns |
| | t_{RPD} | RESET# Low to Standby Mode | Min | 10 | μ s |
| | t_{RB} | RY/BY# Recovery Time | Min | 0 | ns |

Note: CE#, OE# and WE# must be at logic high during Reset Time.

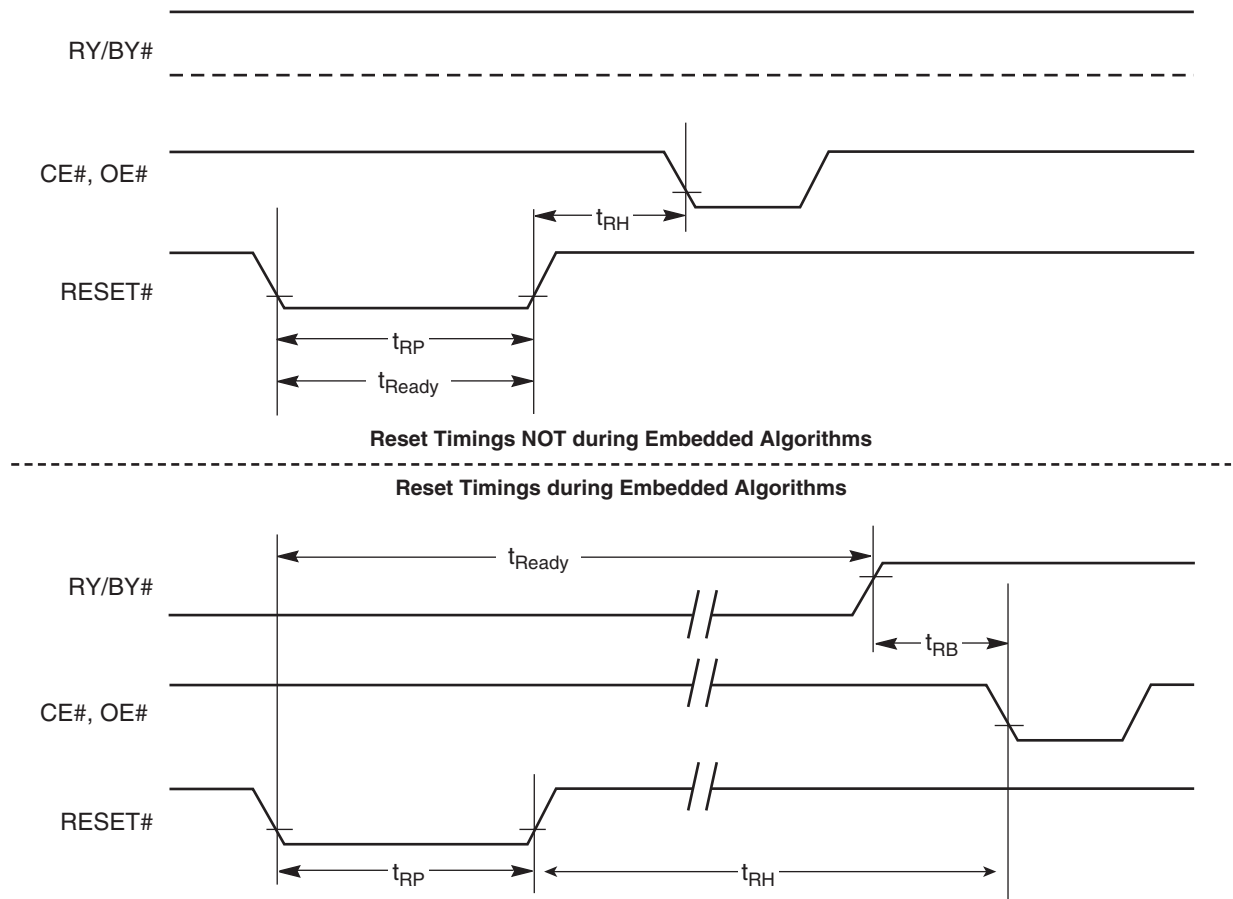


Figure 21. Reset Timings

Table 19. Power-Up Sequence Timings

| Parameter | Description | | Speed | Unit |
|------------|--|-----|-------|---------|
| t_{VCS} | Reset Low Time from Rising Edge of V_{CC} (or last Reset pulse) to Rising Edge of RESET# | Min | 35 | μs |
| t_{VIOS} | Reset Low Time from Rising Edge of V_{IO} (or last Reset pulse) to Rising Edge of RESET# | Min | 35 | μs |
| t_{RH} | Reset High Time Before Read | Max | 200 | ns |

Notes:

- $V_{IO} < V_{CC} + 200\text{ mV}$.
- V_{IO} and V_{CC} ramp must be in sync during power up. If RESET# is not stable for $35\ \mu s$, the following conditions may occur: the device does not permit any read and write operations, valid read operations return FFh, and a hardware reset is required.
- Maximum V_{CC} power up current is 20 mA (RESET# = V_{IL}).

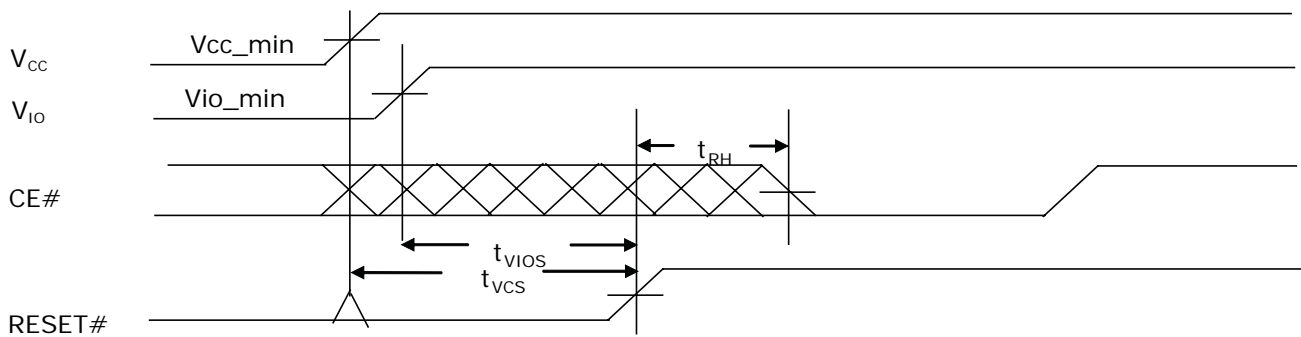


Figure 22. Power-On Reset Timings

Revision Summary

Revision A (September 2, 2003)

Initial Release.

Revision AI (October 16, 2003)

Global

Added LAA064 package.

Distinctive Characteristics, Performance Characteristics

Clarified fifth bullet information.

Added RTSOP to Package Options.

Distinctive Characteristics, Software and Hardware Features

Clarified *Password Sector Protection* to *Advanced Sector Protection*

Connection Diagrams

Removed Note.

Ordering Information

Modified Package codes

Device Bus Operations, Table 1

Modified Table, removed Note.

Sector Address Tables

All address ranges doubled in all sector address tables.

Sector Protection

Lock Register: Corrected text to reflect 3 bits instead of 4.

Table 6, Lock Register: Corrected address range from DQ15-5 to DQ15-3; removed DQ4 and DQ3; Corrected DQ15-3 Lock Register to Don't Care.

Table 7, Sector Protection Schemes: Corrected Sector States.

Command Definitions

Table 12, Command Definitions, x16

Nonvolatile Sector Protection Command Set Entry Second Cycle Address corrected from 55 to 2AA.

Legend: Clarified PWDx, DATA

Notes: Clarified Note 19.

Table 13, Command Definitions, x8

Password Read and Unlock Addresses and Data corrected.

Legend: Clarified PWDx, DATA

Notes: Clarified Note 19.

Test Conditions

[Table 17 on page 75](#), Test Specifications and [Figure 10, on page 76](#), Input Waveforms and Measurement Levels: Corrected Input Pulse Levels to 0.0–V_{IO}; corrected Input timing measurement reference levels to 0.5V_{IO}.

Revision A2 (January 22, 2004)

Lock Register

Corrected and added new text for Secured Silicon Sector Protection Bit, Persistent Protection Mode Lock Bit, and Password Protection Mode Lock Bit.

Persistent Sector Protection

Persistent Protection Bit (PPB): Added the second paragraph text about programming the PPB bit.

Persistent Protection Bit Lock (PPB Lock Bit): Added the second paragraph text about configuring the PPB Lock Bit, and fourth paragraph on Autoselect Sector Protection Verification.

Added PPB Lock Bit requirement of 200ns access time.

Password Sector Protection

Corrected 1 μ s (built-in delay for each password check) to 2 μ s.

Lock Register Command Set Definitions

Added new information for this section.

Password Protection Command Set Definitions

Added new information for this section.

Non-Volatile Sector Protection Command Set Definitions

Added new information for this section.

Global Volatile Sector Protection Freeze Command Set

Added new information for this section.

Volatile Sector Protection Command Set

Added new information for this section.

Secured Silicon Sector Entry Command

Added new information for this section.

Secured Silicon Sector Exit Command

Added new information for this section.

Revision A3 (March 2, 2004)

Connection Diagrams

Removed 56-pin reverse TSOP diagram.

Ordering Information

Updated the Standard Products for the S29GL512/256/128N devices and modified the valid combinations tables.

Word Program Command Sequence

Added new information to this section.

Lock Register Command Set Definitions

Added new information to this section.

Table 13

Updated this table.

Revision A4 (May 13, 2004)

Global

Removed references to RTSOP.

Distinctive Characteristics

Removed 16-word/32-byte page read buffer from Performance Characteristics.

Changed Low power consumption to 25 mA typical active read current and removed 10 mA typical intrapage active read current.

Ordering Information

Changed formatting of pages.

Changed model numbers from 00,01,02,03 to 01, 02, V1, V2.

Table 1, "Device Bus Operations"

Combined WP# and ACC columns.

Table 8, "CFI Query Identification String", Table 9, "System Interface String", Table 10, "Device Geometry Definition", and Table 11, "Primary Vendor-Specific Extended Query"

Added Address (x8) column.

Word Program Command Sequence

Added text to fourth paragraph.

Figure 1, "Write Buffer Programming Operation,"

Added note references and removed DQ15 and DQ13.

Figure 3, "Program Suspend/Program Resume,"

Changed field to read XXXh/B0h and XXXh/30h.

Password Protection Command Set Definitions

Replaced all text.

Command Definitions

Changed the first cycle address of CFI Query to 55.

Table 14, "Memory Array Commands (x8)"

Changed the third cycle data Device ID to 90.

Removed Unlock Bypass Reset.

Removed Note 12 and 13.

Figure 5, "Data# Polling Algorithm,"

Removed DQ15 and DQ13.

Absolute Maximum Ratings

Removed VCC from *All other pins* with respect to Ground.

CMOS Compatible

Changed the Max of I_{CC4} to 70 mA.

Added V_{IL} to the Test conditions of I_{CC5} , I_{CC6} , and I_{CC7}

Change the Min of V_{IL} to - 0.1 V.

Updated note 5.

Read-Only Operations—S29GL128N Only

Added t_{CEH} parameter to table.

Figure 11, "Read Operation Timings,"

Added t_{CEH} to figure.

Figure 12, "Page Read Timings,"

Change A1-A0 to A2-A0.

Erase and Program Operations

Updated t_{WHWH1} and t_{WHWH2} with values.

Figure 16, "Chip/Sector Erase Operation Timings,"

Changed 5555h to 55h and 3030h to 30h.

Figure 17, "Data# Polling Timings (During Embedded Algorithms),"

Removed DQ15 and DQ14-DQ8

Added Note 2

Figure 18, "Toggle Bit Timings (During Embedded Algorithms),"

Changed DQ6 & DQ14/DQ2 & DQ10 to DQ2 and DQ6.

Alternate CE# Controlled Erase and Program Operations

Updated t_{WHWH1} and t_{WHWH2} with values.

Latchup Characteristics

Removed Table.

Erase and Programming Performance

Updated TBD with values.

Updated Note 1 and 2.

Physical Dimensions

Removed the reverse pinout information and note 3.

Revision A5 (September 29, 2004)**Performance Characteristics**

Removed 80 ns.

Product Selector Guide

Updated values in tables.

Ordering Information

Created a family table.

Operating Ranges

Updated VIO.

CMOS Characteristics

Created a family table.

Read-Only Operations

Created a family table.

Hardware Reset (RESET#)

Created a family table.

Figure 13, "Reset Timings,"

Added t_{RH} to waveform.

Erase and Program Operations

Created a family table.

Alternate CE# Controlled Erase and Program Operations

Created a family table.

Erase and Programming Performance

Created a family table.

Revision A6 (January 24, 2005)

Global

Updated access times for S29GL512N.

Product Selector Guides

All tables updated.

Valid Combinations Tables

All tables updated.

AC Characteristics Read-Only Options Table

Added note for 90 ns speed options.

AC Characteristics Erase and Programming Performance Table

Added note for 90 ns speed options.

Figure 17 on page 83

Updated timing diagram.

AC Characteristics Alternate CE# Controlled Erase and Program Operations Table

Added note for 90 ns speed options.

Revision A7 (February 14, 2005)

Distinctive Characteristics

Added Product Availability Table

Ordering Information

Under Model Numbers, changed V_{IO} voltage values for models V1 and V2.

Physical Dimensions

Updated Package Table

Revision A8 (May 9, 2005)

Product Availability Table

Updated data in V_{CC} and availability columns.

Product Selector Guide

Combined GL128N and GL256N tables. Changed upper limit of V_{IO} voltage range to 3.6 V.

Ordering Information

Added wireless temperature range. Combined valid combinations table and updated for wireless temperature range part numbers.

DC Characteristics table

Added $V_{IO} = V_{CC}$ test condition to I_{CC4} , I_{CC5} , I_{CC6} specifications. Corrected unit of measure on I_{CC4} to μA . Changed maximum specifications for I_{ACC} (on ACC pin) and I_{CC3} to 90 mA.

Tables 12–15, Memory Array and Sector Protection (x8 & x16)

Re-formatted command definition tables for easier reference.

Advance Information on S9GL-P AC Characteristics

Changed speed specifications and units of measure for t_{READY} , t_{RP} , t_{RH} , and t_{RPD} . Changed specifications on t_{READY} from maximum to minimum.

Revision A9 (June 15, 2005)**Ordering Information table**

Added note to temperature range.

Valid Combinations table

Replaced table.

DC Characteristics table

Replaced V_{IL} lines for I_{CC4} , I_{CC5} , I_{CC6} .

Connection Diagrams

Modified 56-Pin Standard TSOP (pg 8). Modified 64-ball Fortified BGA.

Advance Information on S9GL-P AC Characteristics

Added second table.

Revision B0 (April 22, 2006)**Global**

Changed document status to Full Production.

Ordering Information

Changed description of "A" for Package Materials Set. Modified S29GL128N Valid Combinations table.

S29GL128N Sector Address Table

Corrected bit range values for A22–A16.

Persistent Protection Bit (PPB)

Corrected typo in second sentence, second paragraph.

Secured Silicon Sector Flash Memory Region

Deleted note at end of second paragraph.

Customer Lockable: Secured Silicon Sector NOT Programmed or Protected At the Factory

Modified 1st bullet text.

Write Protect (WP#)

Modified third paragraph.

Device Geometry Definition table

Changed 1st x8 address for Erase Block Region 2.

Word Program Command Sequence

Modified fourth paragraph.

Write Buffer Programming

Deleted note from eighth paragraph.

Program Suspend/Program Resume Command Sequence

Corrected typos in first paragraph.

Lock Register Command Set Definitions

Modified fifth paragraph.

Volatile Sector Protection Command Set

Modified fourth paragraph.

Sector Protection Commands (x16) table

Changed read command address for Lock Register Bits

Memory Array Commands (x8)

Added Program and Unlock Bypass Mode commands to table.

Write Operation Status

Deleted note (second paragraph).

DC Characteristics table

Modified test conditions for I_{CC4}.

Revision B1 (May 5, 2006)

Ordering Information

Modified speed option, package material set, temperature range descriptions in breakout diagram. Modified Note 1.

Advance Information on S29GL-P AC Characteristics Hardware Reset (RESET#)

Replaced contents in section.

Revision B2 (October 3, 2006)

Connection Diagrams

Corrected 56-pin TSOP package drawing.

Revision B3 (October 13, 2006)

Write Buffer Programming

Deleted reference to incremental bit programming in last paragraph of section.

Colophon

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