Features

- Single Voltage Read/Write Operation: 2.65V to 3.6V
- Access Time – 70 ns
- Sector Erase Architecture
  - Sixty-three 32K Word (64K Bytes) Sectors with Individual Write Lockout
  - Eight 4K Word (8K Bytes) Sectors with Individual Write Lockout
- Fast Word Program Time – 10 µs
- Typical Sector Erase Time: 32K Word Sectors – 700 ms; 4K Word Sectors – 100 ms
- Suspend/Resume Feature for Erase and Program
  - Supports Reading and Programming from Any Sector by Suspending Erase of a Different Sector
  - Supports Reading Any Word by Suspending Programming of Any Other Word
- Low-power Operation
  - 10 mA Active
  - 15 µA Standby
- VPP Pin for Write Protection and Accelerated Program Operations
- $\overline{\text{RESET}}$ Input for Device Initialization
- Softlock Sector Protection
- Secure Lock and Freeze Feature
- Top or Bottom Boot Block Configuration Available
- 128-bit Protection Register
- Minimum 100,000 Erase Cycles
- Common Flash Interface (CFI)
- CBGA Green (Pb/Halide-free/RoHS Compliant) Packaging

1. Description

The AT49BV320S(T) is a 2.7-volt 32-megabit Flash memory organized as 2,097,152 words of 16 bits each. The memory is divided into 71 sectors for erase operations. The device is offered in a 64-ball CBGA package. The device has $\overline{\text{CE}}$ and $\overline{\text{OE}}$ control signals to avoid any bus contention. This device can be read or reprogrammed using a single power supply, making it ideally suited for in-system programming.

In some applications, in addition to the standard softlock sector protection mechanism, a requirement exists to allow for the permanent and irreversible locking of selected region in the memory. The AT49BV320S(T) allows the user to permanently lock eight regions, and once activated these secure regions cannot be altered or erased through Software or Hardware at any time. Once activated, no facility exists to over-ride the secure lock mechanism. The size of each secure region is 32K words, and the location of these regions is determined by the Top or Bottom Boot Block designation. The location of the secure regions is shown on pages 3 - 4.

The secure regions can be locked in any sequence and at any time during normal device operation. If all eight regions are permanently locked, then program and erase operations in 1/8 of the memory will be disabled. Read operations can still be performed on any region that has the secure lock feature enabled. Full read and write operations, standard sector operations including standard Sector locking can be performed on all regions that are not secure locked.

32-megabit (2M x 16) Secure 3-volt Only Memory

AT49BV320S
AT49BV320ST

Summary (Complete Datasheet under NDA)

Not Recommended for New Design

Contact Atmel to discuss the latest design in trends and options

NOTE: This is a summary document. The complete document is available under NDA. For more information, please contact your local Atmel sales office.

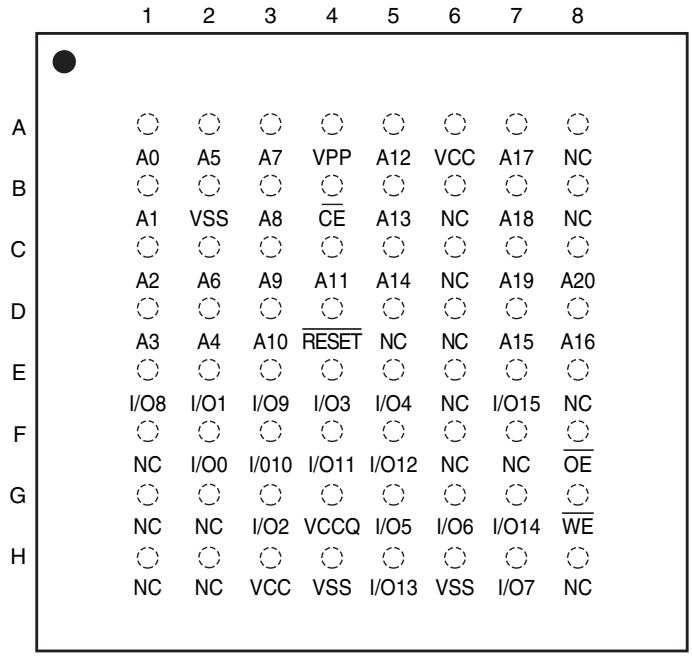
3532AS–FLASH–9/06

The AT49BV320S(T) device also contains a freeze feature that will freeze the lock status of the secure regions. The freeze feature prevents any further locking of the secure regions. If the user requires certain regions to be locked, then these regions must be programmed and locked prior to activation of the freeze command. It is important to note that enabling the freeze feature is irreversible.

2. Pin Configurations

Pin Name	Function
A0 - A20	Addresses
$\overline{CE}$	Chip Enable
$\overline{OE}$	Output Enable
$\overline{WE}$	Write Enable
$\overline{RESET}$	Reset
VPP	Write Protection and Power Supply for Accelerated Program Operations
I/O0 - I/O15	Data Inputs/Outputs
NC	No Connect
VCCQ	Output Power Supply

2.1 64-lead CBGA Top View



3. AT49BV320S – Sector Address Table

Secure Region (SCR)	Sector	Size (Bytes/Words)	Address Range (A20 - A0)
0	SA0	8K/4K	00000 - 00FFF
	SA1	8K/4K	01000 - 01FFF
	SA2	8K/4K	02000 - 02FFF
	SA3	8K/4K	03000 - 03FFF
	SA4	8K/4K	04000 - 04FFF
	SA5	8K/4K	05000 - 05FFF
	SA6	8K/4K	06000 - 06FFF
	SA7	8K/4K	07000 - 07FFF
1	SA8	64K/32K	08000 - 0FFFF
2	SA9	64K/32K	10000 - 17FFF
3	SA10	64K/32K	18000 - 1FFFF
4	SA11	64K/32K	20000 - 27FFF
5	SA12	64K/32K	28000 - 2FFFF
6	SA13	64K/32K	30000 - 37FFF
7	SA14	64K/32K	38000 - 3FFFF
	SA15	64K/32K	40000 - 47FFF
	SA16	64K/32K	48000 - 4FFFF
	SA17	64K/32K	50000 - 57FFF
	SA18	64K/32K	58000 - 5FFFF
	SA19	64K/32K	60000 - 67FFF
	SA20	64K/32K	68000 - 6FFFF
	SA21	64K/32K	70000 - 77FFF
	SA22	64K/32K	78000 - 7FFFF
	SA23	64K/32K	80000 - 87FFF
	SA24	64K/32K	88000 - 8FFFF
	SA25	64K/32K	90000 - 97FFF
	SA26	64K/32K	98000 - 9FFFF
	SA27	64K/32K	A0000 - A7FFF
	SA28	64K/32K	A8000 - AFFFF
	SA29	64K/32K	B0000 - B7FFF
	SA30	64K/32K	B8000 - BFFFF
	SA31	64K/32K	C0000 - C7FFF
	SA32	64K/32K	C8000 - CFFFF
	SA33	64K/32K	D0000 - D7FFF
	SA34	64K/32K	D8000 - DFFFF

3. AT49BV320S – Sector Address Table (Continued)

Sector	Size (Bytes/Words)	Address Range (A20 - A0)
SA35	64K/32K	E0000 - E7FFF
SA36	64K/32K	E8000 - EFFFF
SA37	64K/32K	F0000 - F7FFF
SA38	64K/32K	F8000 - FFFFF
SA39	64K/32K	100000 - 107FFF
SA40	64K/32K	108000 - 10FFFF
SA41	64K/32K	110000 - 117FFF
SA42	64K/32K	118000 - 11FFFF
SA43	64K/32K	120000 - 127FFF
SA44	64K/32K	128000 - 12FFFF
SA45	64K/32K	130000 - 137FFF
SA46	64K/32K	138000 - 13FFFF
SA47	64K/32K	140000 - 147FFF
SA48	64K/32K	148000 - 14FFFF
SA49	64K/32K	150000 - 157FFF
SA50	64K/32K	158000 - 15FFFF
SA51	64K/32K	160000 - 167FFF
SA52	64K/32K	168000 - 16FFFF
SA53	64K/32K	170000 - 177FFF
SA54	64K/32K	178000 - 17FFFF
SA55	64K/32K	180000 - 187FFF
SA56	64K/32K	188000 - 18FFFF
SA57	64K/32K	190000 - 197FFF
SA58	64K/32K	198000 - 19FFFF
SA59	64K/32K	1A0000 - 1A7FFF
SA60	64K/32K	1A8000 - 1AFFFF
SA61	64K/32K	1B0000 - 1B7FFF
SA62	64K/32K	1B8000 - 1BFFFF
SA63	64K/32K	1C0000 - 1C7FFF
SA64	64K/32K	1C8000 - 1CFFFF
SA65	64K/32K	1D0000 - 1D7FFF
SA66	64K/32K	1D8000 - 1DFFFF
SA67	64K/32K	1E0000 - 1E7FFF
SA68	64K/32K	1E8000 - 1EFFFF
SA69	64K/32K	1F0000 -1F7FFF
SA70	64K/32K	1F8000 - 1FFFF

4. AT49BV320ST – Sector Address Table

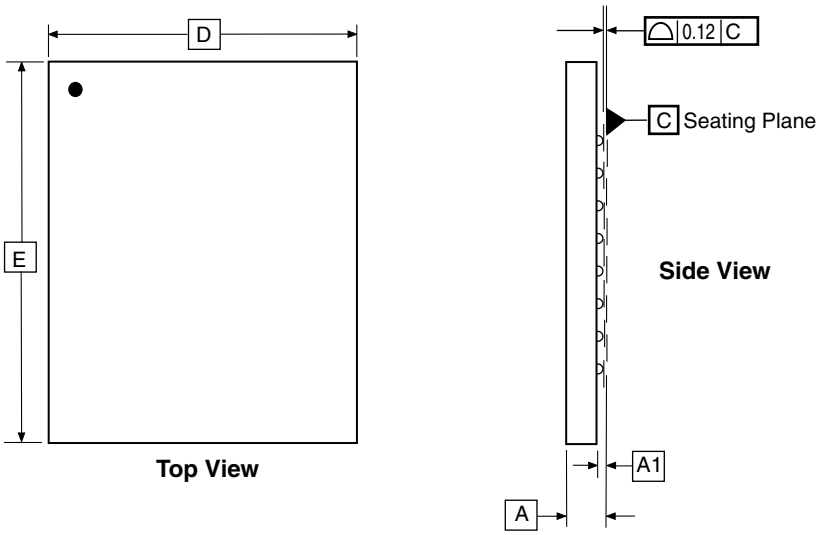
Sector	Size (Bytes/Words)	Address Range (A20 - A0)
SA0	64K/32K	00000 - 07FFF
SA1	64K/32K	08000 - 0FFFF
SA2	64K/32K	10000 - 17FFF
SA3	64K/32K	18000 - 1FFFF
SA4	64K/32K	20000 - 27FFF
SA5	64K/32K	28000 - 2FFFF
SA6	64K/32K	30000 - 37FFF
SA7	64K/32K	38000 - 3FFFF
SA8	64K/32K	40000 - 47FFF
SA9	64K/32K	48000 - 4FFFF
SA10	64K/32K	50000 - 57FFF
SA11	64K/32K	58000 - 5FFFF
SA12	64K/32K	60000 - 67FFF
SA13	64K/32K	68000 - 6FFFF
SA14	64K/32K	70000 - 77FFF
SA15	64K/32K	78000 - 7FFFF
SA16	64K/32K	80000 - 87FFF
SA17	64K/32K	88000 - 8FFFF
SA18	64K/32K	90000 - 97FFF
SA19	64K/32K	98000 - 9FFFF
SA20	64K/32K	A0000 - A7FFF
SA21	64K/32K	A8000 - AFFFF
SA22	64K/32K	B0000 - B7FFF
SA23	64K/32K	B8000 - BFFFF
SA24	64K/32K	C0000 - C7FFF
SA25	64K/32K	C8000 - CFFFF
SA26	64K/32K	D0000 - D7FFF
SA27	64K/32K	D8000 - DFFFF
SA28	64K/32K	E0000 - E7FFF
SA29	64K/32K	E8000 - EFFFF
SA30	64K/32K	F0000 - F7FFF
SA31	64K/32K	F8000 - FFFFF
SA32	64K/32K	100000 - 107FFF
SA33	64K/32K	108000 - 10FFFF
SA34	64K/32K	110000 - 117FFF

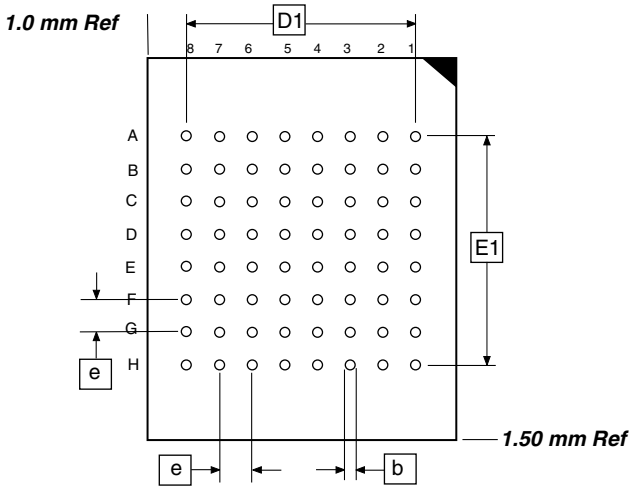
4. AT49BV320ST – Sector Address Table (Continued)

Secure Region (SCR)	Sector	Size (Bytes/Words)	Address Range (A20 - A0)
	SA35	64K/32K	118000 - 11FFFF
	SA36	64K/32K	120000 - 127FFF
	SA37	64K/32K	128000 - 12FFFF
	SA38	64K/32K	130000 - 137FFF
	SA39	64K/32K	138000 - 13FFFF
	SA40	64K/32K	140000 - 147FFF
	SA41	64K/32K	148000 - 14FFFF
	SA42	64K/32K	150000 - 157FFF
	SA43	64K/32K	158000 - 15FFFF
	SA44	64K/32K	160000 - 167FFF
	SA45	64K/32K	168000 - 16FFFF
	SA46	64K/32K	170000 - 177FFF
	SA47	64K/32K	178000 - 17FFFF
	SA48	64K/32K	180000 - 187FFF
	SA49	64K/32K	188000 - 18FFFF
	SA50	64K/32K	190000 - 197FFF
	SA51	64K/32K	198000 - 19FFFF
	SA52	64K/32K	1A0000 - 1A7FFF
	SA53	64K/32K	1A8000 - 1AFFFF
	SA54	64K/32K	1B0000 - 1B7FFF
	SA55	64K/32K	1B8000 - 1BFFFF
7	SA56	64K/32K	1C0000 - 1C7FFF
6	SA57	64K/32K	1C8000 - 1CFFFF
5	SA58	64K/32K	1D0000 - 1D7FFF
4	SA59	64K/32K	1D8000 - 1DFFFF
3	SA60	64K/32K	1E0000 - 1E7FFF
2	SA61	64K/32K	1E8000 - 1EFFFF
1	SA62	64K/32K	1F0000 - 1F7FFF
0	SA63	8K/4K	1F8000 - 1F8FFF
	SA64	8K/4K	1F9000 - 1F9FFF
	SA65	8K/4K	1FA000 - 1FAFFF
	SA66	8K/4K	1FB000 - 1FBFFF
	SA67	8K/4K	1FC000 - 1FCFFF
	SA68	8K/4K	1FD000 - 1FDFFF
	SA69	8K/4K	1FE000 - 1FEFFF
	SA70	8K/4K	1FF000 - 1FFFFF

5. Packaging Information

5.1 64C1 – CBGA





COMMON DIMENSIONS
(Unit of Measure mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	–	–	1.00	
A1	0.23	–	–	
D	8.90	9.00	9.10	
D1		7.0 TYP		
E	9.90	10.00	10.10	
E1		7.0 TYP		
e		1.0 TYP		
b		0.35 TYP		

1/25/05

	TITLE	DRAWING NO.	REV.
2325 Orchard Parkway San Jose, CA 95131	**64C1**, 64-ball (8 x 8 Array), 9 x 10 x 1.0 mm Body, 1.0 mm Ball Pitch Chip-scale Ball Grid Array Package (CBGA)	64C1	B

Atmel Corporation

2325 Orchard Parkway
San Jose, CA 95131, USA
Tel: 1(408) 441-0311
Fax: 1(408) 487-2600

Regional Headquarters

Europe
Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
Tel: (41) 26-426-5555
Fax: (41) 26-426-5500

Asia
Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimshatsui
East Kowloon
Hong Kong
Tel: (852) 2721-9778
Fax: (852) 2722-1369

Japan
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
Tel: (81) 3-3523-3551
Fax: (81) 3-3523-7581

Atmel Operations

Memory
2325 Orchard Parkway
San Jose, CA 95131, USA
Tel: 1(408) 441-0311
Fax: 1(408) 436-4314

Microcontrollers
2325 Orchard Parkway
San Jose, CA 95131, USA
Tel: 1(408) 441-0311
Fax: 1(408) 436-4314

La Chantrerie
BP 70602
44306 Nantes Cedex 3, France
Tel: (33) 2-40-18-18-18
Fax: (33) 2-40-18-19-60

ASIC/ASSP/Smart Cards
Zone Industrielle
13106 Rousset Cedex, France
Tel: (33) 4-42-53-60-00
Fax: (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906, USA
Tel: 1(719) 576-3300
Fax: 1(719) 540-1759

Scottish Enterprise Technology Park
Maxwell Building
East Kilbride G75 0QR, Scotland
Tel: (44) 1355-803-000
Fax: (44) 1355-242-743

RF/Automotive
Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
Tel: (49) 71-31-67-0
Fax: (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906, USA
Tel: 1(719) 576-3300
Fax: 1(719) 540-1759

Biometrics/Imaging/Hi-Rel MPU/
High-Speed Converters/RF Datacom
Avenue de Rochepleine
BP 123
38521 Saint-Egreve Cedex, France
Tel: (33) 4-76-58-30-00
Fax: (33) 4-76-58-34-80

Literature Requests
www.atmel.com/literature

Disclaimer: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. **EXCEPT AS SET FORTH IN ATMEL'S TERMS AND CONDITIONS OF SALE LOCATED ON ATMEL'S WEB SITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.** Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel's products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

© 2006 Atmel Corporation. All rights reserved. Atmel®, logo and combinations thereof, Everywhere You Are® and others are registered trademarks or trademarks of Atmel Corporation or its subsidiaries. Other terms and product names may be trademarks of others.