Features

- Single Voltage Operation Read/Write: 2.65V - 3.6V
- Access Time – 70 ns
- Sector Erase Architecture
  - One Hundred Twenty-seven 32K Word (64K Bytes) Main 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 Data 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 Operation
- $\overline{\text{RESET}}$ 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 AT49BV640S(T) is a 2.7-volt 32-megabit Flash memory organized as 4,194,304 words of 16 bits each. The memory is divided into 135 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 regions in the memory. The AT49BV640S(T) allows the user to permanently lock thirty-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 and the location of the secure regions is determined by the Top or Bottom Boot Block designation. The location of the secure regions is shown on pages 3 - 6.

The secure regions can be locked in any sequence and at any time during normal device operation. Read operations can still be performed on any region that has the secure lock feature enabled. Full read/write operations and standard sector operations including standard Sector locking can be performed on all regions that are not secure locked.

64-megabit (4M x 16) Secure 3-volt Only Memory

AT49BV640S
AT49BV640ST

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.

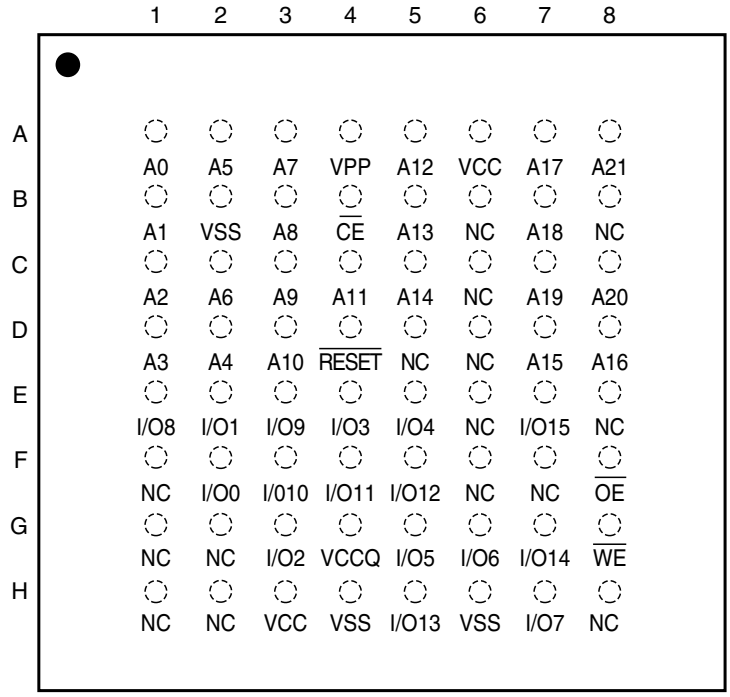
3583AS–FLASH–9/06

The AT49BV640S(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	Pin Function
A0 - A21	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-ball CBGA Top View



3. Memory Organization – AT49BV640S

Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
0	SA0	4K	00000 - 00FFF
	SA1	4K	01000 - 01FFF
	SA2	4K	02000 - 02FFF
	SA3	4K	03000 - 03FFF
	SA4	4K	04000 - 04FFF
	SA5	4K	05000 - 05FFF
	SA6	4K	06000 - 06FFF
	SA7	4K	07000 - 07FFF
1	SA8	32K	08000 - 0FFFF
2	SA9	32K	10000 - 17FFF
3	SA10	32K	18000 - 1FFFF
4	SA11	32K	20000 - 27FFF
5	SA12	32K	28000 - 2FFFF
6	SA13	32K	30000 - 37FFF
7	SA14	32K	38000 - 3FFFF
8	SA15	32K	40000 - 47FFF
	SA16	32K	48000 - 4FFFF
	SA17	32K	50000 - 57FFF
	SA18	32K	58000 - 5FFFF
9	SA19	32K	60000 - 67FFF
	SA20	32K	68000 - 6FFFF
	SA21	32K	70000 - 77FFF
	SA22	32K	78000 - 7FFFF
10	SA23	32K	80000 - 87FFF
	SA24	32K	88000 - 8FFFF
	SA25	32K	90000 - 97FFF
	SA26	32K	98000 - 9FFFF
11	SA27	32K	A0000 - A7FFF
	SA28	32K	A8000 - AFFFF
	SA29	32K	B0000 - B7FFF
	SA30	32K	B8000 - BFFFF
12	SA31	32K	C0000 - C7FFF
	SA32	32K	C8000 - CFFFF
	SA33	32K	D0000 - D7FFF
	SA34	32K	D8000 - DFFFF

3. Memory Organization – AT49BV640S (Continued)

Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
13	SA35	32K	E0000 - E7FFF
	SA36	32K	E8000 - EFFFF
	SA37	32K	F0000 - F7FFF
	SA38	32K	F8000 - FFFFF
14	SA39	32K	100000 - 107FFF
	SA40	32K	108000 - 10FFFF
	SA41	32K	110000 - 117FFF
	SA42	32K	118000 - 11FFFF
15	SA43	32K	120000 - 127FFF
	SA44	32K	128000 - 12FFFF
	SA45	32K	130000 - 137FFF
	SA46	32K	138000 - 13FFFF
16	SA47	32K	140000 - 147FFF
	SA48	32K	148000 - 14FFFF
	SA49	32K	150000 - 157FFF
	SA50	32K	158000 - 15FFFF
17	SA51	32K	160000 - 167FFF
	SA52	32K	168000 - 16FFFF
	SA53	32K	170000 - 177FFF
	SA54	32K	178000 - 17FFFF
18	SA55	32K	180000 - 187FFF
	SA56	32K	188000 - 18FFFF
	SA57	32K	190000 - 197FFF
	SA58	32K	198000 - 19FFFF
19	SA59	32K	1A0000 - 1A7FFF
	SA60	32K	1A8000 - 1AFFFF
	SA61	32K	1B0000 - 1B7FFF
	SA62	32K	1B8000 - 1BFFFF
20	SA63	32K	1C0000 - 1C7FFF
	SA64	32K	1C8000 - 1CFFFF
	SA65	32K	1D0000 - 1D7FFF
	SA66	32K	1D8000 - 1DFFFF
21	SA67	32K	1E0000 - 1E7FFF
	SA68	32K	1E8000 - 1EFFFF
	SA69	32K	1F0000 - 1F7FFF
	SA70	32K	1F8000 - 1FFFFF

3. Memory Organization – AT49BV640S (Continued)

Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
22	SA71	32K	200000 - 207FFF
	SA72	32K	208000 - 20FFFF
	SA73	32K	210000 - 217FFF
	SA74	32K	218000 - 21FFFF
23	SA75	32K	220000 - 227FFF
	SA76	32K	228000 - 22FFFF
	SA77	32K	230000 - 237FFF
	SA78	32K	238000 - 23FFFF
24	SA79	32K	240000 - 247FFF
	SA80	32K	248000 - 24FFFF
	SA81	32K	250000 - 257FFF
	SA82	32K	258000 - 25FFFF
25	SA83	32K	260000 - 267FFF
	SA84	32K	268000 - 26FFFF
	SA85	32K	270000 - 277FFF
	SA86	32K	278000 - 27FFFF
26	SA87	32K	280000 - 287FFF
	SA88	32K	288000 - 28FFFF
	SA89	32K	290000 - 297FFF
	SA90	32K	298000 - 29FFFF
27	SA91	32K	2A0000 - 2A7FFF
	SA92	32K	2A8000 - 2AFFFF
	SA93	32K	2B0000 - 2B7FFF
	SA94	32K	2B8000 - 2BFFFF
28	SA95	32K	2C0000 - 2C7FFF
	SA96	32K	2C8000 - 2CFFFF
	SA97	32K	2D0000 - 2D7FFF
	SA98	32K	2D8000 - 2DFFFF
29	SA99	32K	2E0000 - 2E7FFF
	SA100	32K	2E8000 - 2EFFFF
	SA101	32K	2F0000 - 2F7FFF
	SA102	32K	2F8000 - 2FFFFF

3. Memory Organization – AT49BV640S (Continued)

Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
30	SA103	32K	300000 - 307FFF
	SA104	32K	308000 - 30FFFF
	SA105	32K	310000 - 317FFF
	SA106	32K	318000 - 31FFFF
31	SA107	32K	320000 - 327FFF
	SA108	32K	328000 - 32FFFF
	SA109	32K	330000 - 337FFF
	SA110	32K	338000 - 33FFFF
32	SA111	32K	340000 - 347FFF
	SA112	32K	348000 - 34FFFF
	SA113	32K	350000 - 357FFF
	SA114	32K	358000 - 35FFFF
33	SA115	32K	360000 - 367FFF
	SA116	32K	368000 - 36FFFF
	SA117	32K	370000 - 377FFF
	SA118	32K	378000 - 37FFFF
34	SA119	32K	380000 - 387FFF
	SA120	32K	388000 - 38FFFF
	SA121	32K	390000 - 397FFF
	SA122	32K	398000 - 39FFFF
35	SA123	32K	3A0000 - 3A7FFF
	SA124	32K	3A8000 - 3AFFFF
	SA125	32K	3B0000 - 3B7FFF
	SA126	32K	3B8000 - 3BFFFF
36	SA127	32K	3C0000 - 3C7FFF
	SA128	32K	3C8000 - 3CFFFF
	SA129	32K	3D0000 - 3D7FFF
	SA130	32K	3D8000 - 3DFFFF
37	SA131	32K	3E0000 - 3E7FFF
	SA132	32K	3E8000 - 3EFFFF
	SA133	32K	3F0000 - 3F7FFF
	SA134	32K	3F8000 - 3FFFFF

4. Memory Organization – AT49BV640ST

Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
37	SA0	32K	00000 - 07FFF
	SA1	32K	08000 - 0FFFF
	SA2	32K	10000 - 17FFF
	SA3	32K	18000 - 1FFFF
36	SA4	32K	20000 - 27FFF
	SA5	32K	28000 - 2FFFF
	SA6	32K	30000 - 37FFF
	SA7	32K	38000 - 3FFFF
35	SA8	32K	40000 - 47FFF
	SA9	32K	48000 - 4FFFF
	SA10	32K	50000 - 57FFF
	SA11	32K	58000 - 5FFFF
34	SA12	32K	60000 - 67FFF
	SA13	32K	68000 - 6FFFF
	SA14	32K	70000 - 77FFF
	SA15	32K	78000 - 7FFFF
33	SA16	32K	80000 - 87FFF
	SA17	32K	88000 - 8FFFF
	SA18	32K	90000 - 97FFF
	SA19	32K	98000 - 9FFFF
32	SA20	32K	A0000 - A7FFF
	SA21	32K	A8000 - AFFFF
	SA22	32K	B0000 - B7FFF
	SA23	32K	B8000 - BFFFF
31	SA24	32K	C0000 - C7FFF
	SA25	32K	C8000 - CFFFF
	SA26	32K	D0000 - D7FFF
	SA27	32K	D8000 - DFFFF
30	SA28	32K	E0000 - E7FFF
	SA29	32K	E8000 - EFFFF
	SA30	32K	F0000 - F7FFF
	SA31	32K	F8000 - FFFFF
29	SA32	32K	100000 - 107FFF
	SA33	32K	108000 - 10FFFF
	SA34	32K	110000 - 117FFF
	SA35	32K	118000 - 11FFFF

4. Memory Organization – AT49BV640ST (Continued)

Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
28	SA36	32K	120000 - 127FFF
	SA37	32K	128000 - 12FFFF
	SA38	32K	130000 - 137FFF
	SA39	32K	138000 - 13FFFF
27	SA40	32K	140000 - 147FFF
	SA41	32K	148000 - 14FFFF
	SA42	32K	150000 - 157FFF
	SA43	32K	158000 - 15FFFF
26	SA44	32K	160000 - 167FFF
	SA45	32K	168000 - 16FFFF
	SA46	32K	170000 - 177FFF
	SA47	32K	178000 - 17FFFF
25	SA48	32K	180000 - 187FFF
	SA49	32K	188000 - 18FFFF
	SA50	32K	190000 - 197FFF
	SA51	32K	198000 - 19FFFF
24	SA52	32K	1A0000 - 1A7FFF
	SA53	32K	1A8000 - 1AFFFF
	SA54	32K	1B0000 - 1B7FFF
	SA55	32K	1B8000 - 1BFFFF
23	SA56	32K	1C0000 - 1C7FFF
	SA57	32K	1C8000 - 1CFFFF
	SA58	32K	1D0000 - 1D7FFF
	SA59	32K	1D8000 - 1DFFFF
22	SA60	32K	1E0000 - 1E7FFF
	SA61	32K	1E8000 - 1EFFFF
	SA62	32K	1F0000 - 1F7FFF
	SA63	32K	1F8000 - 1FFFFF
21	SA64	32K	200000 - 207FFF
	SA65	32K	208000 - 20FFFF
	SA66	32K	210000 - 217FFF
	SA67	32K	218000 - 21FFFF
20	SA68	32K	220000 - 227FFF
	SA69	32K	228000 - 22FFFF
	SA70	32K	230000 - 237FFF
	SA71	32K	238000 - 23FFFF

4. Memory Organization – AT49BV640ST (Continued)

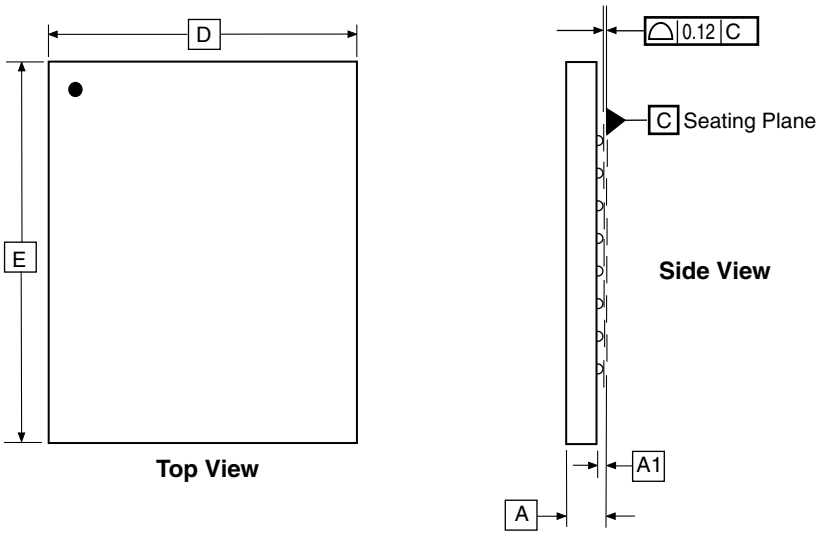
Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
19	SA72	32K	240000 - 247FFF
	SA73	32K	248000 - 24FFFF
	SA74	32K	250000 - 257FFF
	SA75	32K	258000 - 25FFFF
18	SA76	32K	260000 - 267FFF
	SA77	32K	268000 - 26FFFF
	SA78	32K	270000 - 277FFF
	SA79	32K	278000 - 27FFFF
17	SA80	32K	280000 - 287FFF
	SA81	32K	288000 - 28FFFF
	SA82	32K	290000 - 297FFF
	SA83	32K	298000 -29FFFF
16	SA84	32K	2A0000 - 2A7FFF
	SA85	32K	2A8000 - 2AFFFF
	SA86	32K	2B0000 - 2B7FFF
	SA87	32K	2B8000 - 2BFFFF
15	SA88	32K	2C0000 - 2C7FFF
	SA89	32K	2C8000 - 2CFFFF
	SA90	32K	2D0000 - 2D7FFF
	SA91	32K	2D8000 - 2DFFFF
14	SA92	32K	2E0000 - 2E7FFF
	SA93	32K	2E8000 - 2EFFFF
	SA94	32K	2F0000 - 2F7FFF
	SA95	32K	2F8000 - 2FFFFF
13	SA96	32K	300000 - 307FFF
	SA97	32K	308000 - 30FFFF
	SA98	32K	310000 - 317FFF
	SA99	32K	318000 - 31FFFF
12	SA100	32K	320000 - 327FFF
	SA101	32K	328000 - 32FFFF
	SA102	32K	330000 - 337FFF
	SA103	32K	338000 - 33FFFF

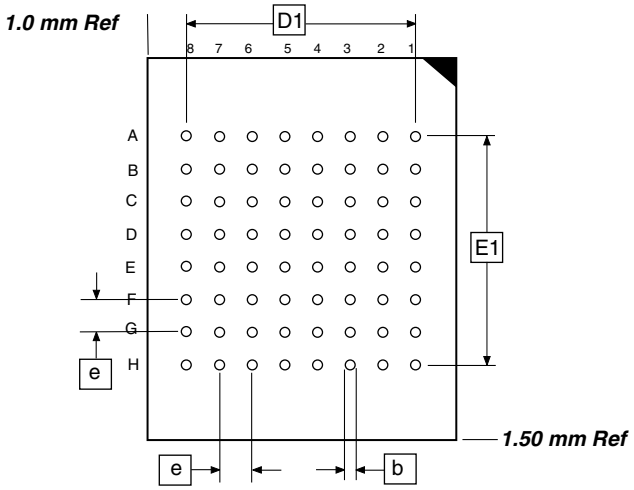
4. Memory Organization – AT49BV640ST (Continued)

Secure Region (SCR)	Sector	Size (Words)	x16 Address Range (A21 - A0)
11	SA104	32K	340000 - 347FFF
	SA105	32K	348000 - 34FFFF
	SA106	32K	350000 - 357FFF
	SA107	32K	358000 - 35FFFF
10	SA108	32K	360000 - 367FFF
	SA109	32K	368000 - 36FFFF
	SA110	32K	370000 - 377FFF
	SA111	32K	378000 - 37FFFF
9	SA112	32K	380000 - 387FFF
	SA113	32K	388000 - 38FFFF
	SA114	32K	390000 - 397FFF
	SA115	32K	398000 - 39FFFF
8	SA116	32K	3A0000 - 3A7FFF
	SA117	32K	3A8000 - 3AFFFF
	SA118	32K	3B0000 - 3B7FFF
	SA119	32K	3B8000 - 3BFFFF
7	SA120	32K	3C0000 - 3C7FFF
6	SA121	32K	3C8000 - 3CFFFF
5	SA122	32K	3D0000 - 3D7FFF
4	SA123	32K	3D8000 - 3DFFFF
3	SA124	32K	3E0000 - 3E7FFF
2	SA125	32K	3E8000 - 3EFFFF
1	SA126	32K	3F0000 - 3F7FFF
0	SA127	4K	3F8000 - 3F8FFF
	SA128	4K	3F9000 - 3F9FFF
	SA129	4K	3FA000 - 3FAFFF
	SA130	4K	3FB000 - 3FBFFF
	SA131	4K	3FC000 - 3FCFFF
	SA132	4K	3FD000 - 3FDFFF
	SA133	4K	3FE000 - 3FEFFF
	SA134	4K	3FF000 - 3FFFFF

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

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