

### Revision History - AS7C164A

| Revision | Details   | Date          |
|----------|---|---------------|
| Rev 1.0  | Preliminary datasheet                                     | November 2009 |
| Rev 2.0  | Added 28pin Skinny PDIP(300mil) package option            | May 2015      |
| Rev 3.0  | Added Industrial grade                                    | Nov. 2016     |
| Rev 4.0  | Removed 12ns speed due to poor yields can only offer 15ns | May 2017      |

### FEATURES

- Fast access time : 15 ns
- Low power consumption:  
Operating current : 80mA (TYP.)  
Standby current : 1mA (TYP.)
- Single 5V power supply
- All inputs and outputs TTL compatible
- Fully static operation
- Tri-state output
- Data retention voltage : 2.0V (MIN.)
- **Green package available**
- Package : 28-pin 300 mil SOJ  
28-pin 300 mil Skinny P-DIP

### GENERAL DESCRIPTION

The AS7C164A is a 65,536-bit high speed CMOS static random access memory organized as 8,192 words by 8 bits. It is fabricated using very high performance, high reliability CMOS technology. Its standby current is stable within the range of operating temperature.

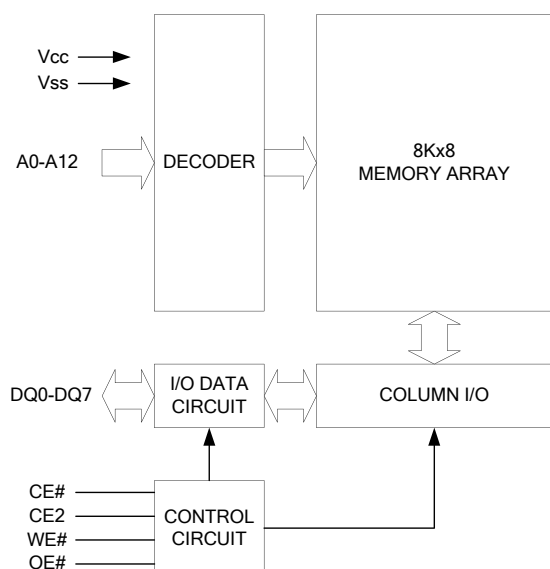
The AS7C164A is well designed for high speed system applications, and particularly well suited for battery back-up nonvolatile memory application.

The AS7C164A operates from a single power supply of 5V and all inputs and outputs are fully TTL compatible

### PRODUCT FAMILY

| Product Family | Operating Temperature          | Vcc Range  | Speed | Power Dissipation               |                                  |
|----------------|--------------------------------|------------|-------|---------------------------------|----------------------------------|
|                |                                |            |       | Standby(I <sub>SB1</sub> ,TYP.) | Operating(I <sub>CC</sub> ,TYP.) |
| AS7C164A       | (C) 0 ~ 70°C<br>(I) -40 ~ 85°C | 4.5 ~ 5.5V | 15ns  | 1mA                             | 90/80mA                          |

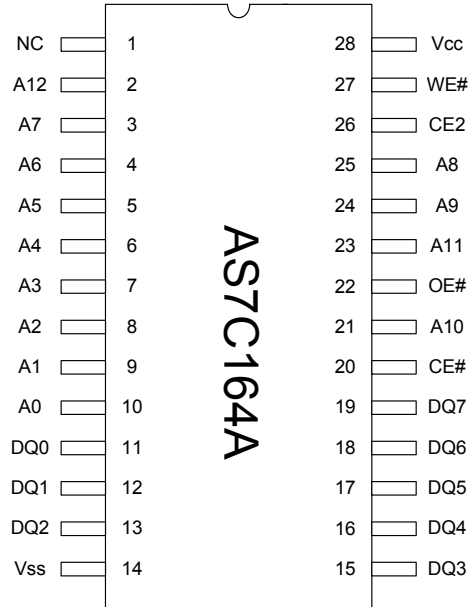
### FUNCTIONAL BLOCK DIAGRAM



### PIN DESCRIPTION

| SYMBOL    | DESCRIPTION         |
|-----------|---------------------|
| A0 - A12  | Address Inputs      |
| DQ0 - DQ7 | Data Inputs/Outputs |
| CE#, CE2  | Chip Enable Inputs  |
| WE#       | Write Enable Input  |
| OE#       | Output Enable Input |
| Vcc       | Power Supply        |
| Vss       | Ground              |
| NC        | No Connection       |

### PIN CONFIGURATION



Skinny PDIP/SOJ

### ABSOLUTE MAXIMUM RATINGS\*

| PARAMETER                                | SYMBOL           | RATING                                 | UNIT |
|--|------------------|--|------|
| Voltage on Vcc relative to Vss           | V <sub>T1</sub>  | -0.5 to 6.5                            | V    |
| Voltage on any other pin relative to Vss | V <sub>T2</sub>  | -0.5 to V <sub>cc</sub> +0.5           | V    |
| Operating Temperature                    | T <sup>A</sup>   | 0 to 70(C grade)<br>-40 to 85(I grade) | °C   |
| Storage Temperature                      | T <sub>STG</sub> | -65 to 150                             | °C   |
| Power Dissipation                        | P <sub>D</sub>   | 1                                      | W    |
| DC Output Current                        | I <sub>OUT</sub> | 50                                     | mA   |

\*Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to the absolute maximum rating conditions for extended period may affect device reliability.

### TRUTH TABLE

| MODE           | CE# | CE2 | OE# | WE# | I/O OPERATION    | SUPPLY CURRENT   |
|----------------|-----|-----|-----|-----|------------------|------------------|
| Standby        | H   | X   | X   | X   | High-Z           | I <sub>SB1</sub> |
|                | X   | L   | X   | X   | High-Z           | I <sub>SB1</sub> |
| Output Disable | L   | H   | H   | H   | High-Z           | I <sub>CC</sub>  |
| Read           | L   | H   | L   | H   | D <sub>OUT</sub> | I <sub>CC</sub>  |
| Write          | L   | H   | X   | L   | D <sub>IN</sub>  | I <sub>CC</sub>  |

Note: H = V<sub>IH</sub>, L = V<sub>IL</sub>, X = Don't care.

Alliance Memory Inc. 511 Taylor Way, San Carlos, CA 94070 TEL: (650) 610-6800 FAX: (650) 620-9211  
Alliance Memory Inc. reserves the right to change products or specification without notice

### DC ELECTRICAL CHARACTERISTICS

| PARAMETER                              | SYMBOL                       | TEST CONDITION   | MIN. | TYP. <sup>4</sup> | MAX.                 | UNIT |    |
|--|------------------------------|--|------|-------------------|----------------------|------|----|
| Supply Voltage                         | V <sub>CC</sub>              |  | 4.5  | 5.0               | 5.5                  | V    |    |
| Input High Voltage                     | V <sub>IH</sub> <sup>1</sup> |  | 2.4  | -                 | V <sub>CC</sub> +0.5 | V    |    |
| Input Low Voltage                      | V <sub>IL</sub> <sup>2</sup> |  | -0.5 | -                 | 0.8                  | V    |    |
| Input Leakage Current                  | I <sub>LI</sub>              | V <sub>CC</sub> ≥ V <sub>IN</sub> ≥ V <sub>SS</sub>  | -1   | -                 | 1                    | μA   |    |
| Output Leakage Current                 | I <sub>LO</sub>              | V <sub>CC</sub> ≥ V <sub>OUT</sub> ≥ V <sub>SS</sub> ,<br>Output Disabled  | -1   | -                 | 1                    | μA   |    |
| Output High Voltage                    | V <sub>OH</sub>              | I <sub>OH</sub> = -1mA   | 2.4  | -                 | -                    | V    |    |
| Output Low Voltage                     | V <sub>OL</sub>              | I <sub>OL</sub> = 2mA  | -    | -                 | 0.4                  | V    |    |
| Average Operating Power supply Current | I <sub>CC</sub>              | Cycle time = Min.<br>CE# = V <sub>IL</sub> and CE2 = V <sub>IH</sub> ,<br>I <sub>I/O</sub> = 0mA<br>Other pins at V <sub>IH</sub> or V <sub>IL</sub> | -15  | -                 | 80                   | 140  | mA |
| Standby Power Supply Current           | I <sub>SB1</sub>             | CE# ≥ V <sub>CC</sub> -0.2V or CE2 ≤ 0.2V<br>Other pins at 0.2V or V <sub>CC</sub> -0.2V   | -    | 1                 | 5                    | mA   |    |

Notes:

- V<sub>IH</sub>(max) = V<sub>CC</sub> + 3.0V for pulse width less than 10ns.
- V<sub>IL</sub>(min) = V<sub>SS</sub> - 3.0V for pulse width less than 10ns.
- Over/Undershoot specifications are characterized, not 100% tested.
- Typical values are included for reference only and are not guaranteed or tested.  
Typical values are measured at V<sub>CC</sub> = V<sub>CC</sub>(TYP.) and T<sub>A</sub> = 25°C

### CAPACITANCE (T<sub>A</sub> = 25°C, f = 1.0MHz)

| PARAMETER                | SYMBOL           | MIN. | MAX | UNIT |
|--------------------------|------------------|------|-----|------|
| Input Capacitance        | C <sub>IN</sub>  | -    | 6   | pF   |
| Input/Output Capacitance | C <sub>I/O</sub> | -    | 8   | pF   |

Note : These parameters are guaranteed by device characterization, but not production tested.

### AC TEST CONDITIONS

|  |   |
|--|---|
| Input Pulse Levels                       | 0.2V to V <sub>CC</sub> - 0.2V  |
| Input Rise and Fall Times                | 3ns   |
| Input and Output Timing Reference Levels | 1.5V  |
| Output Load                              | C <sub>L</sub> = 30pF + 1TTL, I <sub>OH</sub> /I <sub>OL</sub> = -4mA/8mA |

### AC ELECTRICAL CHARACTERISTICS

#### (1) READ CYCLE

| PARAMETER                          | SYM.               | AS7C164A-15 |      | UNIT |
|------------------------------------|--------------------|-------------|------|------|
|                                    |                    | MIN.        | MAX. |      |
| Read Cycle Time                    | t <sub>RC</sub>    | 15          | -    | ns   |
| Address Access Time                | t <sub>AA</sub>    | -           | 15   | ns   |
| Chip Enable Access Time            | t <sub>ACE</sub>   | -           | 15   | ns   |
| Output Enable Access Time          | t <sub>OE</sub>    | -           | 7    | ns   |
| Chip Enable to Output in Low-Z     | t <sub>CLZ</sub> * | 4           | -    | ns   |
| Output Enable to Output in Low-Z   | t <sub>OLZ</sub> * | 0           | -    | ns   |
| Chip Disable to Output in High-Z   | t <sub>CHZ</sub> * | -           | 7    | ns   |
| Output Disable to Output in High-Z | t <sub>OHZ</sub> * | -           | 7    | ns   |
| Output Hold from Address Change    | t <sub>OH</sub>    | 3           | -    | ns   |

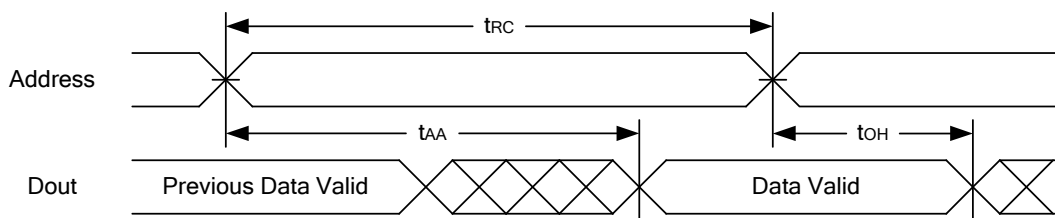
#### (2) WRITE CYCLE

| PARAMETER                        | SYM.               | AS7C164A-15 |      | UNIT |
|----------------------------------|--------------------|-------------|------|------|
|                                  |                    | MIN.        | MAX. |      |
| Write Cycle Time                 | t <sub>WC</sub>    | 15          | -    | ns   |
| Address Valid to End of Write    | t <sub>AW</sub>    | 12          | -    | ns   |
| Chip Enable to End of Write      | t <sub>CW</sub>    | 12          | -    | ns   |
| Address Set-up Time              | t <sub>AS</sub>    | 0           | -    | ns   |
| Write Pulse Width                | t <sub>WP</sub>    | 10          | -    | ns   |
| Write Recovery Time              | t <sub>WR</sub>    | 0           | -    | ns   |
| Data to Write Time Overlap       | t <sub>DW</sub>    | 8           | -    | ns   |
| Data Hold from End of Write Time | t <sub>DH</sub>    | 0           | -    | ns   |
| Output Active from End of Write  | t <sub>OW</sub> *  | 4           | -    | ns   |
| Write to Output in High-Z        | t <sub>WHZ</sub> * | -           | 8    | ns   |

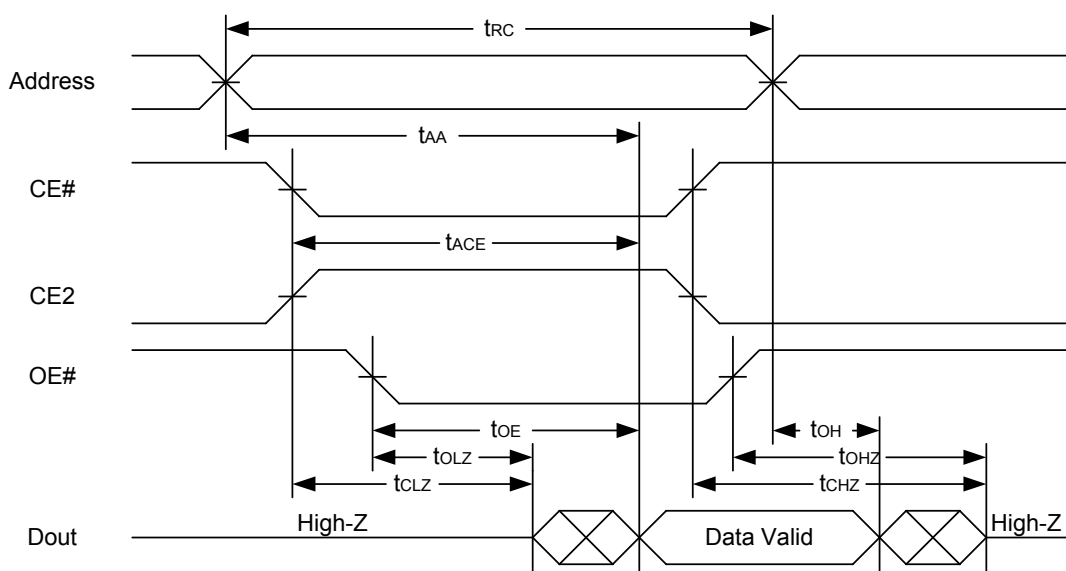
\*These parameters are guaranteed by device characterization, but not production tested.

### TIMING WAVEFORMS

#### READ CYCLE 1 (Address Controlled) (1,2)



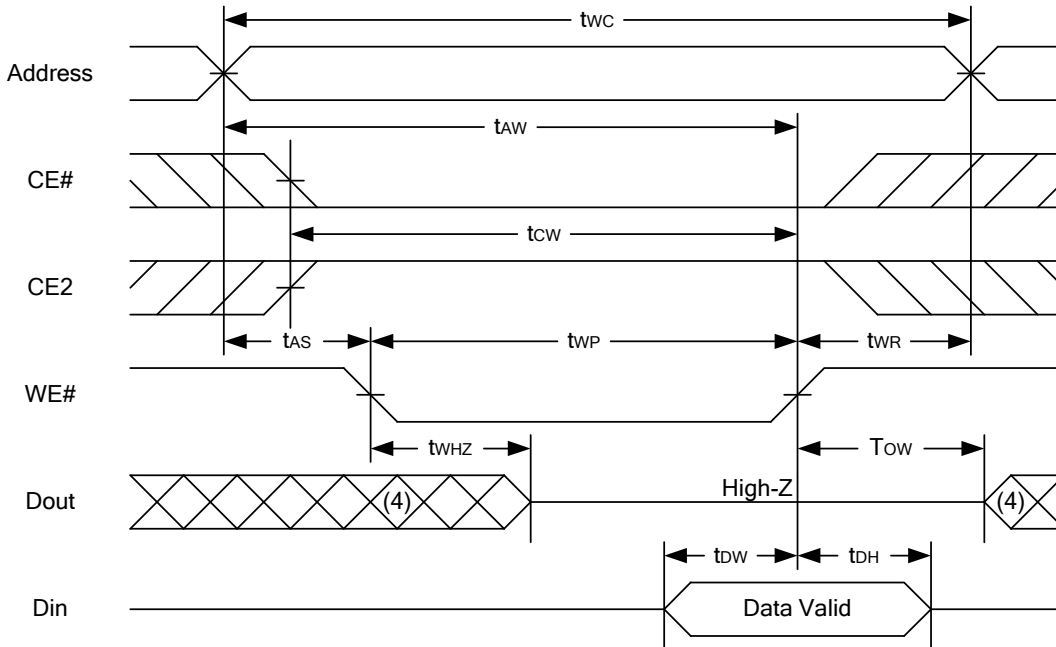
#### READ CYCLE 2 (CE# and CE2 and OE# Controlled) (1,3,4,5)



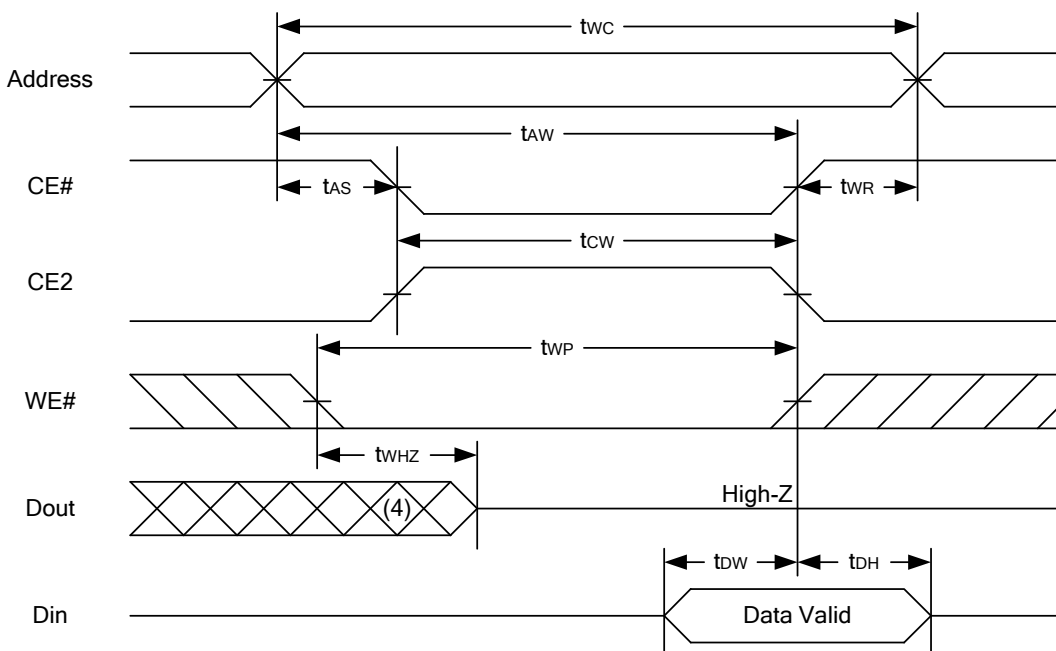
Notes :

1. WE# is high for read cycle.
2. Device is continuously selected OE# = low, CE# = low, CE2 = high.
3. Address must be valid prior to or coincident with CE# = low, CE2 = high; otherwise tAA is the limiting parameter.
4. tCLZ, tOLZ, tCHZ and tOHZ are specified with CL = 5pF. Transition is measured ±500mV from steady state.
5. At any given temperature and voltage condition, tCHZ is less than tCLZ, tOHZ is less than tOLZ.

### WRITE CYCLE 1 (WE# Controlled) (1,2,3,5,6)



### WRITE CYCLE 2 (CE# and CE2 Controlled) (1,2,5,6)



**Notes :**

1. WE#, CE# must be high or CE2 must be low during all address transitions.
2. A write occurs during the overlap of a low CE#, high CE2, low WE#.
3. During a WE#-controlled write cycle with OE# low, twp must be greater than twh + tdw to allow the drivers to turn off and data to be placed on the bus.
4. During this period, I/O pins are in the output state, and input signals must not be applied.
5. If the CE# low transition and CE2 high transition occurs simultaneously with or after WE# low transition, the outputs remain in a high impedance state.
6. tow and twh are specified with CL = 5pF. Transition is measured ±500mV from steady state.

Alliance Memory Inc. 511 Taylor Way, San Carlos, CA 94070 TEL: (650) 610-6800 FAX: (650) 620-9211

Alliance Memory Inc. reserves the right to change products or specification without notice

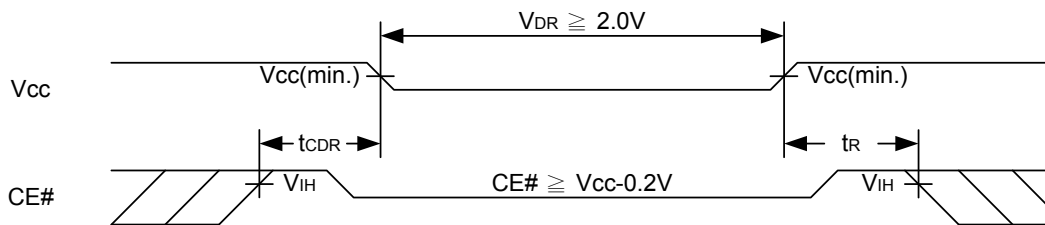
### DATA RETENTION CHARACTERISTICS

| PARAMETER                           | SYMBOL           | TEST CONDITION  | MIN.              | TYP. | MAX. | UNIT |
|-------------------------------------|------------------|---|-------------------|------|------|------|
| Vcc for Data Retention              | V <sub>DR</sub>  | CE# ≥ V <sub>CC</sub> - 0.2V<br>or CE2 ≤ 0.2V   | 2.0               | -    | 5.5  | V    |
| Data Retention Current              | I <sub>DR</sub>  | V <sub>CC</sub> = 2.0V<br>CE# ≥ V <sub>CC</sub> - 0.2V or CE2 ≤ 0.2V<br>Others at 0.2V or V <sub>CC</sub> -0.2V | -                 | 0.6  | 3    | mA   |
| Chip Disable to Data Retention Time | t <sub>CDR</sub> | See Data Retention Waveforms (below)  | 0                 | -    | -    | ns   |
| Recovery Time                       | t <sub>R</sub>   |   | t <sub>RC</sub> * | -    | -    | ns   |

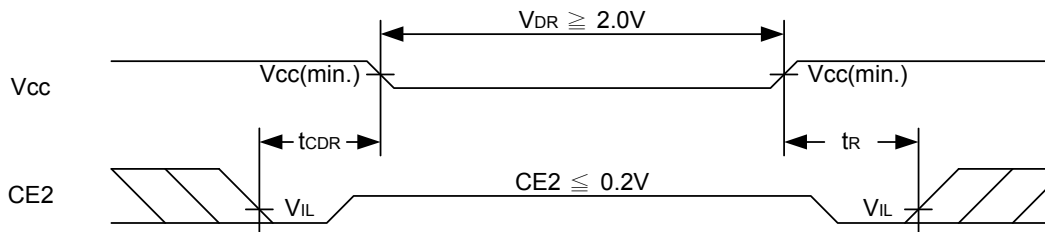
t<sub>RC</sub>\* = Read Cycle Time

### DATA RETENTION WAVEFORM

#### Low Vcc Data Retention Waveform (1) (CE# controlled)

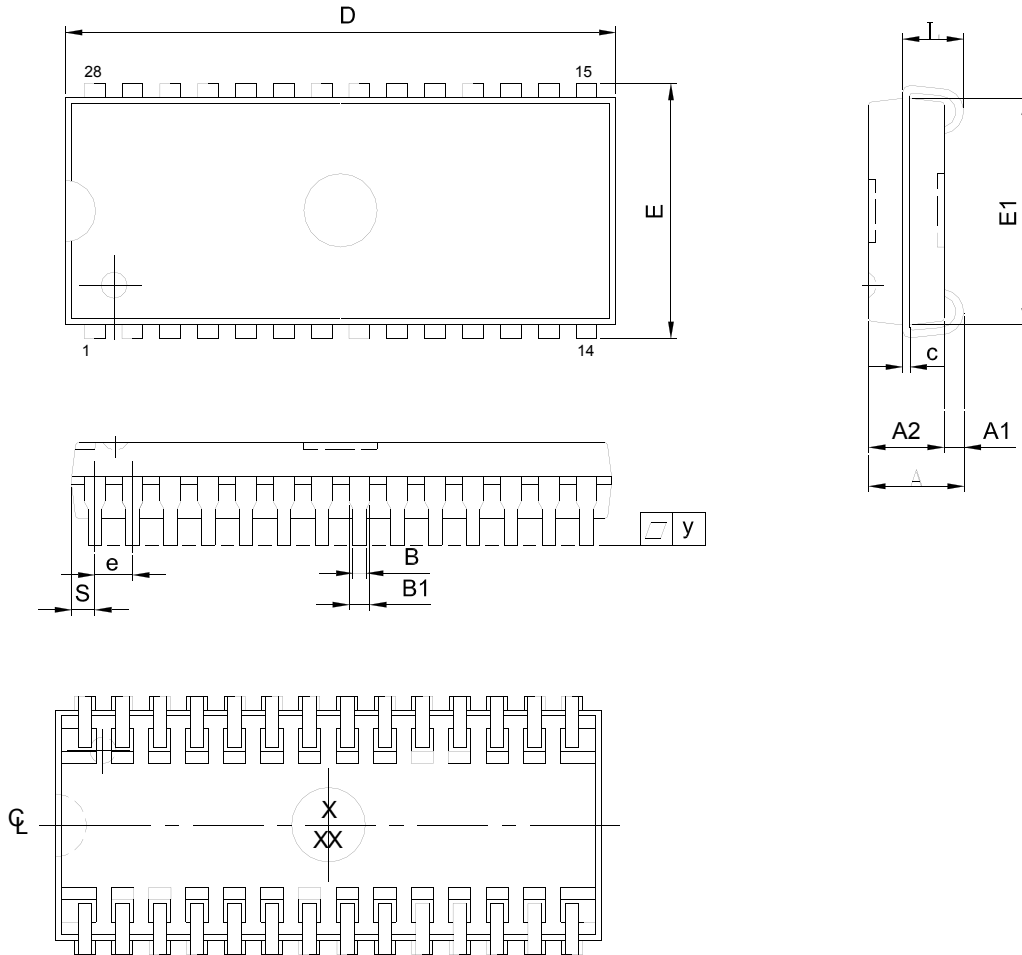


#### Low Vcc Data Retention Waveform (2) (CE2 controlled)





### 28-pin 300 mil SOJ Package Outline Dimension



| SYM. | UNIT | INCH(REF)    | MM(BASE)    |
|------|------|--------------|-------------|
| A    |      | 0.140 (MAX)  | 3.556 (MAX) |
| A1   |      | 0.026 (MIN)  | 0.660 (MIN) |
| A2   |      | 0.100±0.005  | 2.540±0.127 |
| B    |      | 0.018±0.003  | 0.457±0.076 |
| B1   |      | 0.028 ±0.003 | 0.711±0.076 |
| c    |      | 0.010±0.003  | 0.254±0.076 |
| D    |      | 0.710±0.010  | 18.03±0.254 |
| E    |      | 0.337±0.010  | 8.560±0.254 |
| E1   |      | 0.300±0.005  | 7.620±0.127 |
| e    |      | 0.050±0.003  | 1.270±0.076 |
| L    |      | 0.087±0.010  | 2.210±0.254 |
| S    |      | 0.030±0.004  | 0.762±0.102 |
| Y    |      | 0.003 (MAX)  | 0.076 (MAX) |

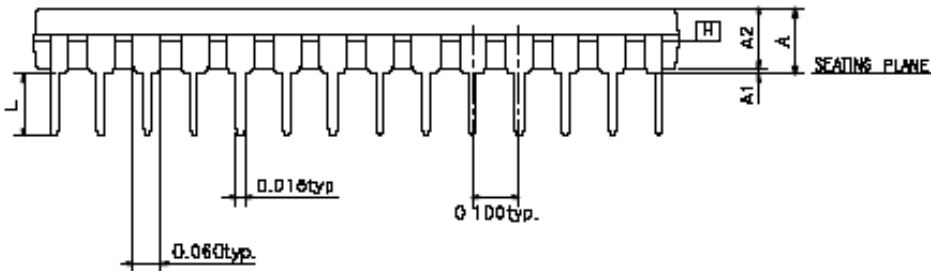
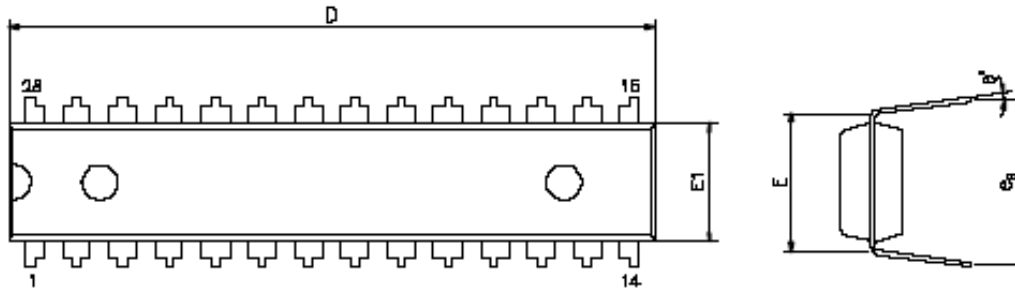
Note : 1.S/E/D dimension is not including mold flash.

2.The end flash in package lengthwise is not more than 10 mils each side.

Alliance Memory Inc. 511 Taylor Way, San Carlos, CA 94070 TEL: (650) 610-6800 FAX: (650) 620-9211  
 Alliance Memory Inc. reserves the right to change products or specification without notice

### PACKAGE OUTLINE DIMENSION

28 pin 300 mil PDIP Package Outline Dimension



| SYMBOLS        | MIN.      | NOR.  | MAX.  |
|----------------|-----------|-------|-------|
| A              | —         | —     | 0.210 |
| A1             | 0.015     | —     | —     |
| A2             | 0.125     | 0.130 | 0.135 |
| D              | 1.385     | 1.390 | 1.400 |
| E              | 0.310 BSC |       |       |
| E1             | 0.283     | 0.288 | 0.293 |
| L              | 0.115     | 0.130 | 0.150 |
| e <sub>B</sub> | 0.330     | 0.350 | 0.370 |
| θ°             | 0         | 7     | 15    |

UNIT : INCH

NOTE:

1. JEDEC OUTLINE : MS-D15 AH



# AS7C164A

## 8K x 8BIT HIGH SPEED CMOS SRAM

### ORDERING INFORMATION

| Package/Access Time         | Temperature | 15 ns          |
|-----------------------------|-------------|----------------|
| 28-pin 300 mil SOJ          | Commercial  | AS7C164A-15JCN |
| 28-pin 300 mil Skinny P-DIP | Commercial  | AS7C164A-15PCN |
| 28-pin 300 mil SOJ          | Industrial  | AS7C164A-15JIN |
| 28-pin 300 mil Skinny P-DIP | Industrial  | AS7C164A-15PIN |

Suffix TR = tape and reel

### PART NUMBERING SYSTEM

| AS7C        |                       | 164A             | -15            | J/P  | C/I   | N                  |
|-------------|-----------------------|------------------|----------------|--|---|--------------------|
| SRAM prefix | Voltage:<br>5V supply | Device<br>Number | Access<br>Time | J = SOJ, 300 mil<br>P= Skinny P-DIP, 300 mil | Temperature<br>Range:<br>C = 0° ~ 70 °C<br>I = -40° ~ 85° C | N = Lead Free Part |



Alliance Memory, Inc.  
511 Taylor Way,  
San Carlos, CA 94070  
Tel: 650-610-6800  
Fax: 650-620-9211  
[www.alliancememory.com](http://www.alliancememory.com)

Copyright © Alliance Memory  
All Rights Reserved

© Copyright 2007 Alliance Memory, Inc. All rights reserved. Our three-point logo, our name and Intelliwatt are trademarks or registered trademarks of Alliance. All other brand and product names may be the trademarks of their respective companies. Alliance reserves the right to make changes to this document and its products at any time without notice. Alliance assumes no responsibility for any errors that may appear in this document. The data contained herein represents Alliance's best data and/or estimates at the time of issuance. Alliance reserves the right to change or correct this data at any time, without notice. If the product described herein is under development, significant changes to these specifications are possible. The information in this product data sheet is intended to be general descriptive information for potential customers and users, and is not intended to operate as, or provide, any guarantee or warranty to any user or customer. Alliance does not assume any responsibility or liability arising out of the application or use of any product described herein, and disclaims any express or implied warranties related to the sale and/or use of Alliance products including liability or warranties related to fitness for a particular purpose, merchantability, or infringement of any intellectual property rights, except as express agreed to in Alliance's Terms and Conditions of Sale (which are available from Alliance). All sales of Alliance products are made exclusively according to Alliance's Terms and Conditions of Sale. The purchase of products from Alliance does not convey a license under any patent rights, copyrights; mask works rights, trademarks, or any other intellectual property rights of Alliance or third parties. Alliance does not authorize its products for use as critical components in life-supporting systems where a malfunction or failure may reasonably be expected to result in significant injury to the user, and the inclusion of Alliance products in such life-supporting systems implies that the manufacturer assumes all risk of such use and agrees to indemnify Alliance against all claims arising from such use.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.