High Performance
128K×8 3.3V
CMOS SRAM

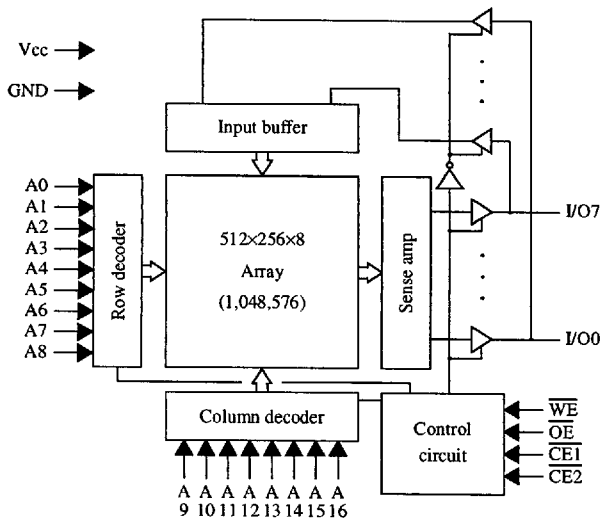
AS7C3102+
AS7C3102+L

# Low voltage 128K×8 CMOS SRAM (Common I/O)

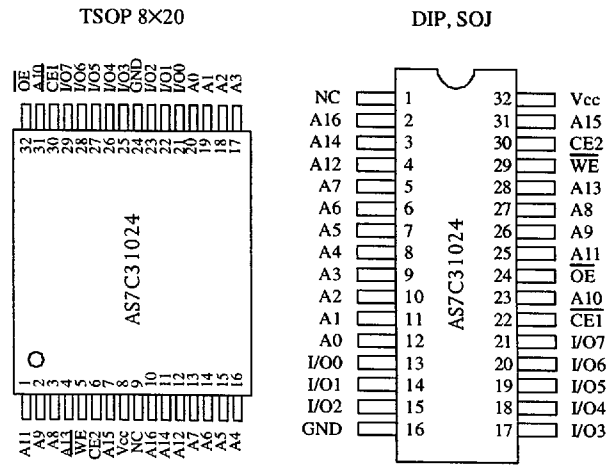
## Features

- Organization: 131,072 words × 8 bits
- Single 3.3 ±0.3V power supply
- 5V tolerant I/O specification
- High speed
  - 12/15/20/25/35 ns address access time
  - 3/4/5/6/8 ns output enable access time
- Very low power consumption
- Active:270 mW max, (12 ns cycle)
  - Standby: 18. mW max, CMOS I/O
    3.6 mW max, CMOS I/O, L version
- 2.0V data retention
- Equal access and cycle times
- Easy memory expansion with $\overline{CE1}$, CE2 and $\overline{OE}$ inputs
- TTL-compatible, three-state I/O
- Ideal for cache, modem, portable computing
  - 75% power reduction during CPU idle mode
- 32-pin JEDEC standard packages
  - 300 mil PDIP and SOJ
  - 8 × 20 TSOP
- ESD protection >2000 volts
- Latch-up current >200 mA

## Logic block diagram




## Pin arrangement




## Selection guide

| | | 7C31024-12 | 7C31024-15 | 7C31024-20 | 7C31024-25 | 7C31024-35 | Unit |
|---|---|---|---|---|---|---|---|
| Maximum address access time | | 12 | 15 | 20 | 25 | 35 | ns |
| Maximum output enable access time | | 3 | 4 | 5 | 6 | 8 | ns |
| Maximum operating current | | 75 | 70 | 65 | 60 | 55 | mA |
| Maximum CMOS standby current | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | mA |
| | L | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | mA |

Shaded areas contain advance information.

## Functional description

The AS7C31024 is a 3.3V high performance CMOS 1,048,576-bit Static Random Access Memory (SRAM) organized as 131,072 words × 8 bits. It is designed for memory applications requiring fast data access at low voltage, including Pentium™, PowerPC™, and portable computing. Alliance's advanced circuit design and process techniques permit 3.3V operation without sacrificing performance or operating margins.

The device enters standby mode when $\overline{CE1}$ is HIGH or CE2 is LOW. CMOS standby mode consumes ≤18. mW (≤3.6mW for the L version). Normal operation offers 75% power reduction after initial access, resulting in significant power savings during CPU idle, suspend, and stretch mode. Both versions of the AS7C31024 offer 2.0V data retention.

Equal address access and cycle times ($t_{AA}$, $t_{RC}$, $t_{WC}$) of 12/15/20/25/35 ns with output enable access times ($t_{OE}$) of 3/4/5/6/8 ns are ideal for high performance applications. The active high and low chip enables ($\overline{CE1}$, CE2) permit easy memory expansion with multiple-bank memory systems.

A write cycle is accomplished by asserting write enable ($\overline{WE}$) and both chip enables ($\overline{CE1}$, CE2). Data on the input pins I/O0-I/O7 is written on the rising edge of $\overline{WE}$ (write cycle 1) or the active-to-inactive edge of $\overline{CE1}$ or CE2 (write cycle 2). To avoid bus contention, external devices should drive I/O pins only after outputs have been disabled with output enable ($\overline{OE}$) or write enable ($\overline{WE}$).

A read cycle is accomplished by asserting output enable ($\overline{OE}$) and both chip enables ($\overline{CE1}$, CE2), with write enable ($\overline{WE}$) HIGH. The chip drives I/O pins with the data word referenced by the input address. When either chip enable or output enable is inactive, or write enable is active, output drivers stay in high-impedance mode.

All chip inputs and outputs are TTL-compatible, and 5V tolerant. Operation is from a single 3.3±0.3V supply. The AS7C31024 is packaged in all high volume industry standard packages.

## Absolute maximum ratings

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Power supply voltage relative to GND | $V_{CC}$ | −0.5 | +4.6 | V |
| Input voltage relative to GND | $V_{IN}$ | −0.5 | +6.0 | V |
| Power dissipation | $P_D$ | – | 1.0 | W |
| Storage temperature (plastic) | $T_{stg}$ | −55 | +150 | °C |
| Temperature under bias | $T_{bias}$ | −10 | +85 | °C |
| DC output current | $I_{out}$ | – | 20 | 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 at these or any other conditions outside those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability

## Truth table

| $\overline{CE1}$ | CE2 | $\overline{WE}$ | $\overline{OE}$ | Data | Mode |
|---|---|---|---|---|---|
| H | X | X | X | High Z | Standby ($I_{SB}$, $I_{SB1}$) |
| X | L | X | X | High Z | Standby ($I_{SB}$, $I_{SB1}$) |
| L | H | H | H | High Z | Output disable |
| L | H | H | L | $D_{out}$ | Read |
| L | H | L | X | $D_{in}$ | Write |

Key: X = Don't Care, L = LOW, H = HIGH

## Recommended operating conditions

$T_a$ = 0°C to +70°C

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | 3.0 | 3.3 | 3.6 | V |
| | GND | 0.0 | 0.0 | 0.0 | V |
| Input voltage | $V_{IH}$ | 2.0 | – | 5.5 | V |
| | $V_{IL}$ | −0.5† | – | 0.8 | V |

†$V_{IL}$ min = −2.0V for pulse width less than $t_{RC}/2$.

## DC operating characteristics[1]

$V_{CC}$ = 3.3±0.3V, GND = 0V, $T_a$ = 0°C to +70°C

| | | | | -12 | | -15 | | -20 | | -25 | | -35 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Symbol | Test Conditions | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Unit |
| Input leakage current | $\|I_{LI}\|$ | $V_{CC}$ = Max, $V_{in}$ = GND to $V_{CC}$ | | – | 1 | – | 1 | – | 1 | – | 1 | – | 1 | µA |
| Output leakage current | $\|I_{LO}\|$ | $\overline{CE1}$ = $V_{IH}$ or CE2 = $V_{IL}$, $V_{CC}$ = Max, $V_{out}$ = GND to $V_{CC}$ | | – | 1 | – | 1 | – | 1 | – | 1 | – | 1 | µA |
| Operating power supply current | $I_{CC}$ | $\overline{CE1}$ = $V_{IL}$, CE2 = $V_{IH}$, f = $f_{max}$, $I_{out}$ = 0 mA | | – | 75 | – | 70 | – | 65 | – | 60 | – | 55 | mA |
| Standby power supply current | $I_{SB}$ | $\overline{CE1}$ = $V_{IH}$ or CE2 = $V_{IL}$, f = $f_{max}$ | | – | 35 | – | 30 | – | 25 | – | 25 | – | 20 | mA |
| | $I_{SB1}$ | $\overline{CE1}$ ≥ $V_{CC}$−0.2V or CE2 ≤ 0.2V, $V_{in}$ ≤ 0.2V or $V_{in}$ ≥ $V_{CC}$−0.2V, f = 0 | | – | 5.0 | – | 5.0 | – | 5.0 | – | 5.0 | – | 5.0 | mA |
| | | | L | – | 1.0 | – | 1.0 | – | 1.0 | – | 1.0 | – | 1.0 | mA |
| Output voltage | $V_{OL}$ | $I_{OL}$ = 8 mA, $V_{CC}$ = Min | | – | 0.4 | – | 0.4 | – | 0.4 | – | 0.4 | – | 0.4 | V |
| | $V_{OH}$ | $I_{OH}$ = −4 mA, $V_{CC}$ = Min | | 2.4 | – | 2.4 | – | 2.4 | – | 2.4 | – | 2.4 | – | V |

## Capacitance[2]

f = 1 MHz, $T_a$ = Room temperature, $V_{CC}$ = 3.3V

| Parameter | Symbol | Signals | Test Conditions | Max | Unit |
|---|---|---|---|---|---|
| Input capacitance | $C_{IN}$ | A, $\overline{CE1}$, CE2, $\overline{WE}$, $\overline{OE}$ | $V_{in}$ = 0V | 5 | pF |
| I/O capacitance | $C_{I/O}$ | I/O | $V_{in}$ = $V_{out}$ = 0V | 7 | pF |

## Read cycle[3,9,12]

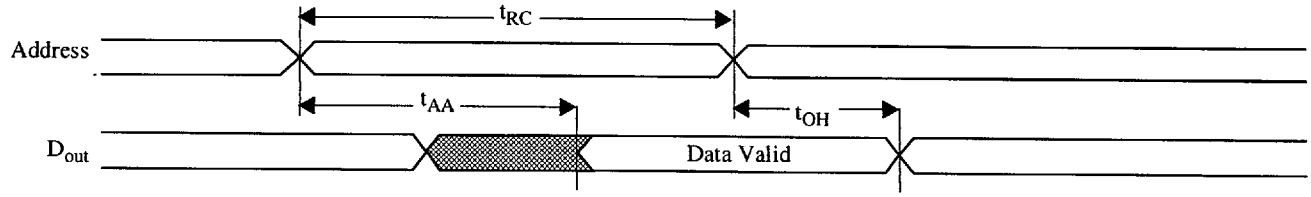
($V_{CC}$ = 3.3±0.3V, GND = 0V, $T_a$ = 0°C to +70°C)

| | | -12 | | -15 | | -20 | | -25 | | -35 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Unit | Notes |
| Read cycle time | $t_{RC}$ | 12 | – | 15 | – | 20 | – | 25 | – | 35 | – | ns | |
| Address access time | $t_{AA}$ | – | 12 | – | 15 | – | 20 | – | 25 | – | 35 | ns | 3 |
| Chip enable ($\overline{CE1}$) access time | $t_{ACE1}$ | – | 12 | – | 15 | – | 20 | – | 25 | – | 35 | ns | 3, 12 |
| Chip enable (CE2) access time | $t_{ACE2}$ | – | 12 | – | 15 | – | 20 | – | 25 | – | 35 | ns | 3, 12 |
| Output enable ($\overline{OE}$) access time | $t_{OE}$ | – | 3 | – | 4 | – | 5 | – | 6 | – | 8 | ns | |
| Output Hold from address change | $t_{OH}$ | 3 | – | 3 | – | 3 | – | 3 | – | 3 | – | ns | 5 |
| $\overline{CE1}$ LOW to output in Low Z | $t_{CLZ1}$ | 3 | – | 3 | – | 3 | – | 3 | – | 3 | – | ns | 4, 5, 12 |
| CE2 HIGH to output in Low Z | $t_{CLZ2}$ | 3 | – | 3 | – | 3 | – | 3 | – | 3 | – | ns | 4, 5, 12 |
| $\overline{CE1}$ HIGH to output in High Z | $t_{CHZ1}$ | – | 3 | – | 4 | – | 5 | – | 6 | – | 8 | ns | 4, 5, 12 |
| CE2 LOW to output in High Z | $t_{CHZ2}$ | – | 3 | – | 4 | – | 5 | – | 6 | – | 8 | ns | 4, 5, 12 |
| $\overline{OE}$ LOW to output in Low Z | $t_{OLZ}$ | 0 | – | 0 | – | 0 | – | 0 | – | 0 | – | ns | 4, 5 |
| $\overline{OE}$ HIGH to output in High Z | $t_{OHZ}$ | – | 3 | – | 4 | – | 5 | – | 6 | – | 8 | ns | 4, 5 |
| Power up time | $t_{PU}$ | 0 | – | 0 | – | 0 | – | 0 | – | 0 | – | ns | 4, 5, 12 |
| Power down time | $t_{PD}$ | – | 12 | – | 15 | – | 20 | – | 25 | – | 35 | ns | 4, 5, 12 |

Shaded areas contain advance information.

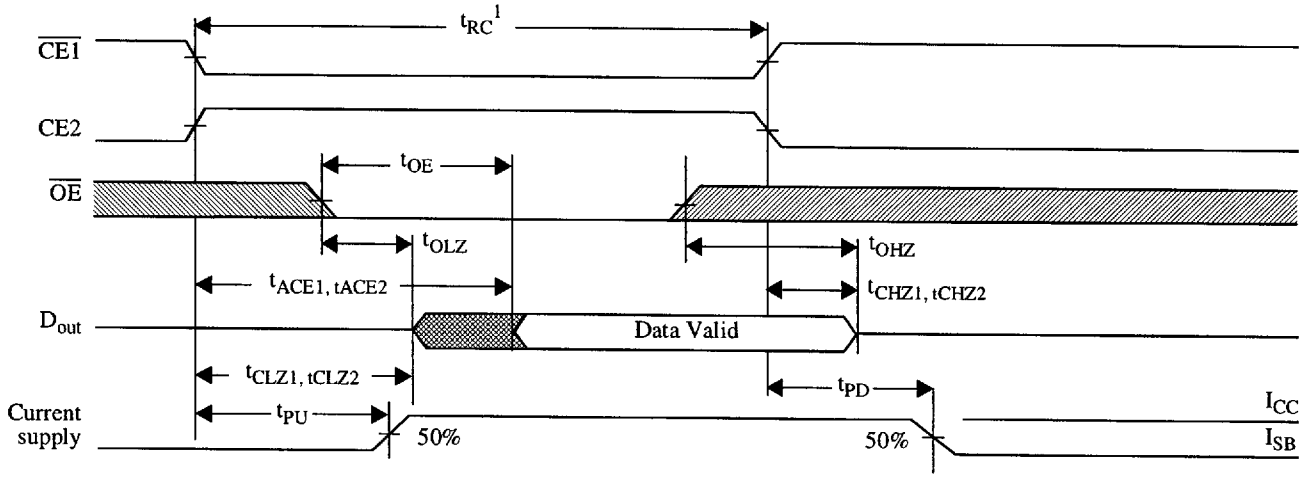
## Read waveform 1[3,6,7,9,12]

Address controlled




## Read waveform 2[3,6,8,9,12]

$\overline{CE1}$ and CE2 controlled



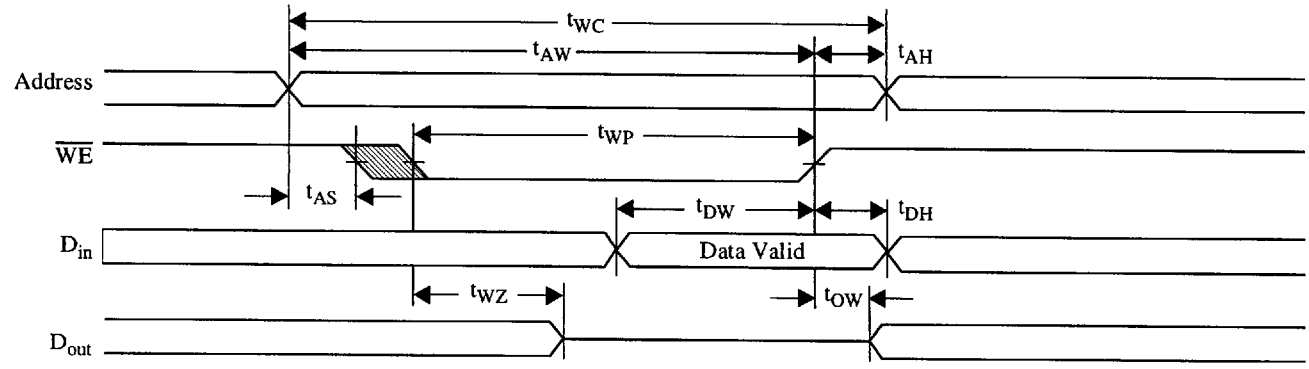
## Write cycle[11,12]

($V_{CC}$ = 3.3±0.3V, GND = 0V, Ta = 0°C to +70°C)

| | | -12 | | -15 | | -20 | | -25 | | -35 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parameter | Symbol | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Unit | Notes |
| Write cycle Time | $t_{WC}$ | 12 | – | 15 | – | 20 | – | 20 | – | 30 | – | ns | |
| Chip enable ($\overline{CE1}$) to write end | $t_{CW1}$ | 10 | – | 12 | – | 12 | – | 15 | – | 20 | – | ns | 12 |
| Chip enable (CE2) to write end | $t_{CW2}$ | 10 | – | 12 | – | 12 | – | 15 | – | 20 | – | ns | 12 |
| Address setup to write end | $t_{AW}$ | 10 | – | 12 | – | 12 | – | 15 | – | 20 | – | ns | |
| Address setup time | $t_{AS}$ | 0 | – | 0 | – | 0 | – | 0 | – | 0 | – | ns | 12 |
| Write pulse width | $t_{WP}$ | 8 | – | 9 | – | 12 | – | 15 | – | 17 | – | ns | |
| Address hold from end of write | $t_{AH}$ | 0 | – | 0 | – | 0 | – | 0 | – | 0 | – | ns | |
| Data valid to write end | $t_{DW}$ | 6 | – | 8 | – | 10 | – | 12 | – | 15 | – | ns | |
| Data hold time | $t_{DH}$ | 0 | – | 0 | – | 0 | – | 0 | – | 0 | – | ns | 4, 5 |
| Write enable to output in High Z | $t_{WZ}$ | – | 5 | – | 5 | – | 5 | – | 5 | – | 5 | ns | 4, 5 |
| Output active from write end | $t_{OW}$ | 3 | – | 3 | – | 3 | – | 3 | – | 3 | – | ns | 4, 5 |

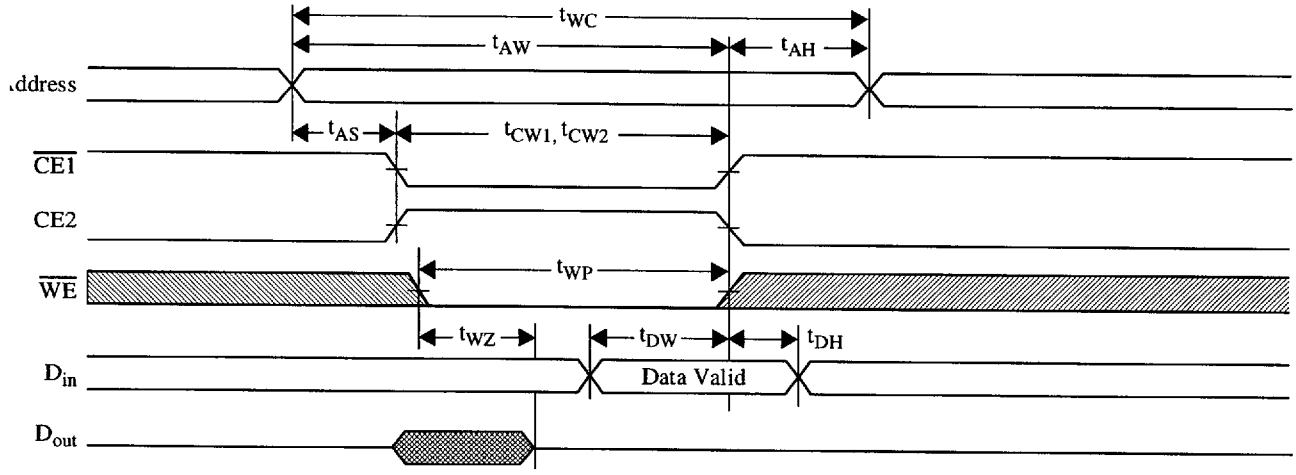
## Write waveform 1[10,11,12]

$\overline{WE}$ controlled




## Write waveform 2[10,11,12]

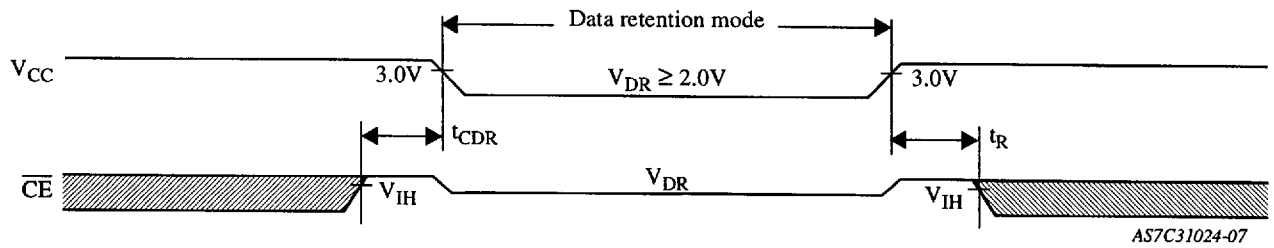
$\overline{CE1}$ and CE2 controlled



## Data retention characteristics

| Parameter | Symbol | Test Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ for data retention | $V_{DR}$ | $V_{CC}$ = 2.0V | 2.0 | – | V |
| Data retention current | $I_{CCDR}$ | $\overline{CE1} \geq V_{CC}-0.2V$ or CE2 ≤ 0.2V | – | 2500 | µA |
| | | | – | 500 | µA |
| Chip enable to data retention time | $t_{CDR}$ | $V_{in} \geq V_{CC}-0.2V$ or $V_{in} \leq 0.2V$ | 0 | – | ns |
| Operation recovery time | $t_R$ | | $t_{RC}$ | – | ns |
| Input leakage current | $\lvert I_{LI} \rvert$ | | – | 1 | µA |

## Data retention waveform




## AC test conditions

- Output load: see Figure B, except for $t_{CLZ}$ and $t_{CHZ}$ see Figure C.
- Input pulse level: GND to 3.0V. See Figure A.
- Input rise and fall times: 5 ns. See Figure A.
- Input and output timing reference levels: 1.5V.

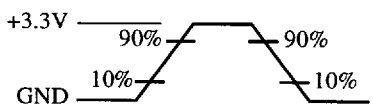



Figure A: Input waveform

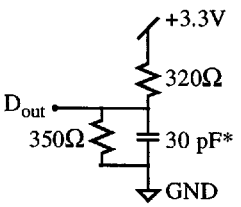



Figure B: Output load

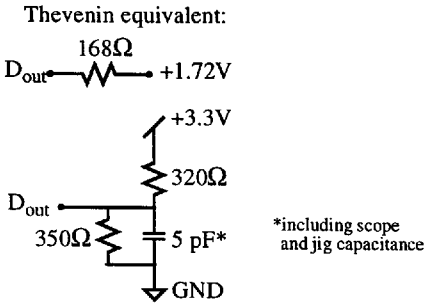


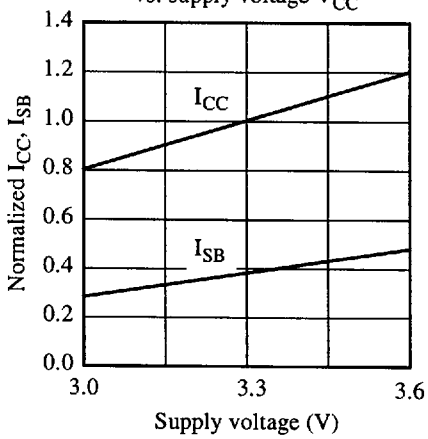

Figure C: Output load for $t_{CLZ}$, $t_{CHZ}$

## Notes

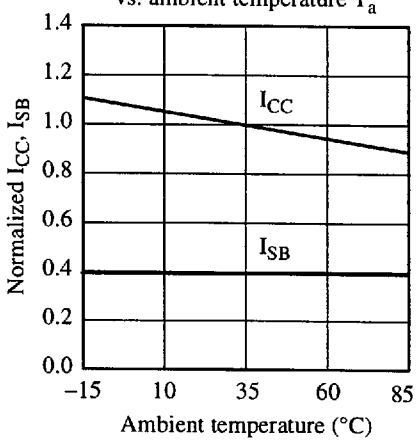
1 During $V_{CC}$ power-up, a pull-up resistor to $V_{CC}$ on $\overline{CE1}$ is required to meet $I_{SB}$ specification.
2 This parameter is sampled and not 100% tested.
3 For test conditions, see *AC Test Conditions*, Figures A, B, C.
4 $t_{CLZ}$ and $t_{CHZ}$ are specified with CL = 5pF as in Figure C. Transition is measured ±500mV from steady-state voltage.
5 This parameter is guaranteed but not tested.
6 $\overline{WE}$ is HIGH for read cycle.
7 $\overline{CE1}$ and $\overline{OE}$ are LOW and CE2 is HIGH for read cycle.
8 Address valid prior to or coincident with $\overline{CE}$ transition LOW.
9 All read cycle timings are referenced from the last valid address to the first transitioning address.
10 $\overline{CE1}$ or $\overline{WE}$ must be HIGH or CE2 LOW during address transitions.
11 All write cycle timings are referenced from the last valid address to the first transitioning address.
12 $\overline{CE1}$ and CE2 have identical timing.

## Typical DC and AC characteristics

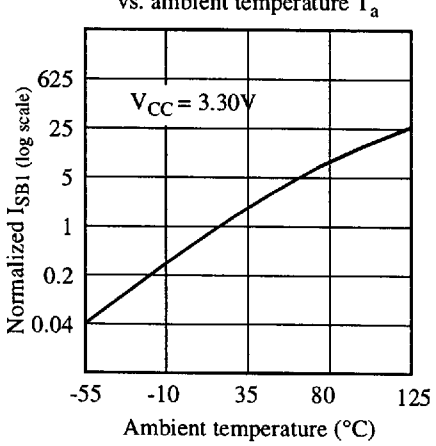
Normalized supply current $I_{CC}$, $I_{SB}$ vs. supply voltage $V_{CC}$



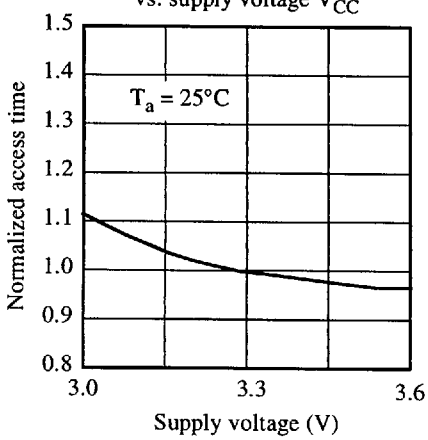

Normalized supply current $I_{CC}$, $I_{SB}$ vs. ambient temperature $T_a$



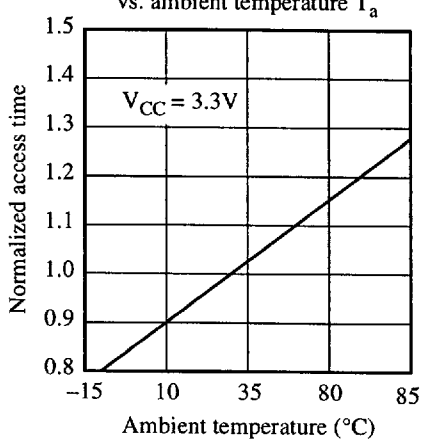

Normalized supply current $I_{SB1}$ vs. ambient temperature $T_a$



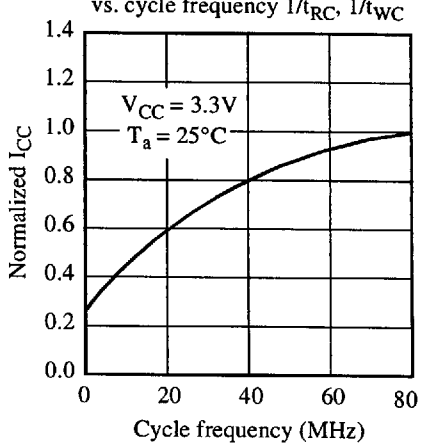

Normalized access time $t_{AA}$ vs. supply voltage $V_{CC}$



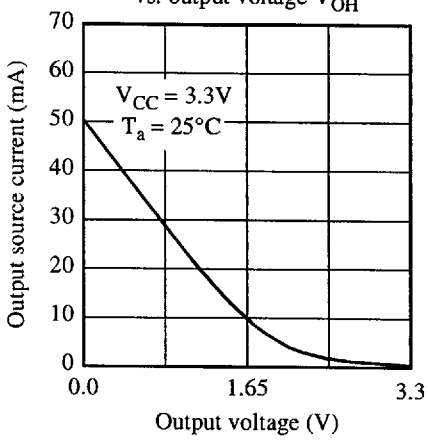

Normalized access time $t_{AA}$ vs. ambient temperature $T_a$



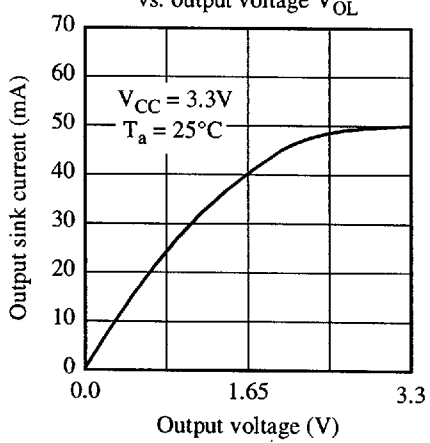

Normalized supply current $I_{CC}$ vs. cycle frequency $1/t_{RC}$, $1/t_{WC}$



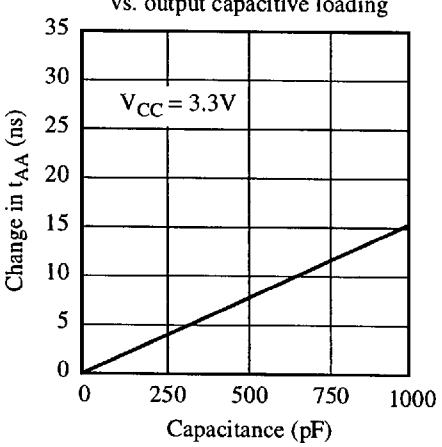

Output source current $I_{OH}$ vs. output voltage $V_{OH}$




Output sink current $I_{OL}$ vs. output voltage $V_{OL}$




Typical access time change $\Delta t_{AA}$ vs. output capacitive loading



## Ordering information

| Package \ Access Time | 12 ns | 15 ns | 20 ns | 25 ns | 35 ns |
|---|---|---|---|---|---|
| Plastic DIP, 300 mil | AS7C31024-12PC | AS7C31024-15PC | AS7C31024-20PC | AS7C31024-25PC | AS7C31024-35PC |
| | AS7C31024L-12PC | AS7C31024L-15PC | AS7C31024L-20PC | AS7C31024L-25PC | AS7C31024L-35PC |
| Plastic SOJ, 300 mil | AS7C31024-12JC | AS7C31024-15JC | AS7C31024-20JC | AS7C31024-25JC | AS7C31024-35JC |
| | AS7C31024L-12JC | AS7C31024L-15JC | AS7C31024L-20JC | AS7C31024L-25JC | AS7C31024L-35JC |
| TSOP 8x20 | AS7C31024-12TC | AS7C31024-15TC | AS7C31024-20TC | AS7C31024-25TC | AS7C31024-35TC |
| | AS7C31024L-12TC | AS7C31024L-15TC | AS7C31024L-20TC | AS7C31024L-25TC | AS7C31024L-35TC |

## Part numbering system

| AS7C | 3 | 1024 | –XX | X | C |
|---|---|---|---|---|---|
| SRAM prefix | Blank = 5V supply<br>3 = 3.3V supply | Device number | Access time | Package: P = PDIP 300 mil<br>J = SOJ 300 mil<br>T = TSOP 8x20 | Commercial tmperature range, 0°C to 70°C |

## Representatives, distributors, and sales offices

**DOMESTIC REPS**

**ALABAMA**
Concord Component
(205) 772-8883

**ARIZONA**
Southern States Marketing
(214) 238-7500

**CALIFORNIA**
North
Brooks Technical
(415) 960-3880
LA Area
Competitive Tech.
(714) 450-0170
San Diego
ATS
(619) 634-1488

**COLORADO**
Technology Sales
(303) 692-8835

**CONNECTICUT**
Kitchen & Kutchin
(203) 239-0212

**DELAWARE**
Electro Tech
(610) 272-2125

**FLORIDA**
Micro-Electronic Comp.
Deerfield Beach
(954) 426-8944
Orlando
(407) 682-9602
Tampa
(813) 393-5011

**GEORGIA**
Concord Component
(770) 416-9597

**HAWAII**
Brooks Technical
(415) 960-3880

**IDAHO**
ES/Chase
(503) 684-8500

**ILLINOIS**
North
El-Mech
(312) 794-9100
South
CenTech
(314) 291-4230

**INDIANA**
CC Electro Sales
(317) 921-5000

**KANSAS**
CenTech
(816) 358-8100

**KENTUCKY**
CC Electro Sales
(317) 921-5000

**LOUISIANA**
Southern States Marketing
North
(214) 238-7500
South
(713) 895-8533

**MAINE**
Kitchen & Kutchin
(617) 229-2660

**MARYLAND**
Chesapeake Tech.
(301) 236-0530

**MASSACHUSETTS**
Kitchen & Kutchin
(617) 229-2660

**MICHIGAN**
Enco Group
(810) 338-8600

**MINNESOTA**
D. A. Case Associates
(612) 831-6777

**MISSOURI**
CenTech
East
(314) 291-4230
West
(816) 358-8100

**MISSISSIPPI**
Concord Component
(205) 772-8883

**MONTANA**
ES/Chase
(503) 684-8500

**NEBRASKA**
CenTech
(816) 358-8100

**NEVADA**
Brooks Technical
(415) 960-3880

**NEW HAMPSHIRE**
Kitchen & Kutchin
(617) 229-2660

**NEW JERSEY**
North
ERA Associates
(800) 645-5500
South
Electro Tech
(610) 272-2125

**NEW YORK**
NYC
ERA Associates
(516) 543-0510
Upstate
Tri-Tech
Rochester
(716) 385-6500
Binghamton
(607) 722-3580

**NORTH CAROLINA**
Concord Component
(919) 846-3441

**NORTH DAKOTA**
D. A. Case Associates
(612) 831-6777

**OHIO**
Midwest Marketing Assoc.
Lyndhurst
(216) 381-8575
Dayton
(513) 433-2511

**OKLAHOMA**
Southern States Marketing
(214) 238-7500

**OREGON**
ES/Chase
(503) 684-8500

**PENNSYLVANIA**
East
Electro Tech
(610) 272-2125
West
Midwest Marketing
(216) 381-8575

**RHODE ISLAND**
Kitchen & Kutchin
(617) 229-2660

**SOUTH CAROLINA**
Concord Component
(919) 846-3441

**SOUTH DAKOTA**
D. A. Case Associates
(612) 831-6777

**TENNESSEE**
Concord Component
(205) 772-8883

**TEXAS**
Southern States Marketing
Austin
(512) 835-5822
Dallas
(214) 238-7500
Houston
(713) 895-8533

**UTAH**
Charles Fields & Assoc.
(801) 299-8228

**VERMONT**
Kitchen & Kutchin
(617) 229-2660

**VIRGINIA**
Chesapeake Tech.
(301) 236-0530

**WASHINGTON**
ES/Chase
(206) 823-9535

**WEST VIRGINIA**
Chesapeake Tech.
(301) 236-0530

**WISCONSIN**
D. A. Case Associates
(612) 831-6777

**WYOMING**
Technology Sales
(303)692-8835

**INTERNATIONAL REPS**

**AUSTRALIA**
Dingley
R&D Electronics
+61-3-9558-0444
Bayswater
ACD
+61-3-9762-7644

**CANADA**
J Squared Technologies
Ottawa
(613) 592-9540
Toronto
(905) 672-2030
Montreal
(514) 747-1211
Vancouver
(604) 473-4666
Calgary
(403) 291-6755

**EUROPE**
Britcomp Sales
Surrey, England
+44-1932 347077
+44-1932 346256
Munich, Germany
+49-894488496
Athismons, France
+33-1-69387678

interACTIVE
Great Britain, Ireland
+44-1773-740263

Ramtec Int'l B.V.
Holland, Spain, Italy, Belgium, Hungary, Russia
+31-2526-21222

**HONG KONG**
Eastele Technology
+852-2798-8860

**INDIA**
Priya Electronics, Inc.
San Jose, CA USA
(408) 954-1866

Satcom Sales & Srvcs.
+91-40-761-4675

**ISRAEL**
Eldis Technology
+972-9-562-666

**JAPAN**
Tokyo
Bussan Micro Electronics
+81-3-5421-1730
Kyoto
Rohm Co. Ltd.
+81-75-311-2121

**KOREA**
FM Korea
+822-596-3880
fm@ktnet.co.kr

Woo Young Tech
+822-369-7099

**MALAYSIA**
Exer Technologies
+60-4-657-9592

**PUERTO RICO**
Micro-Electronic Comp.
(787) 746-9897

**SINGAPORE**
Exer Technologies
+65-749-1349

**TAIWAN**
Asian Specific Tech.
+886-2-521-2363

Golden Way Electronics
+886-2-698-1868 x505

Puteam International
+886-2-729-0373

**DISTRIBUTORS**

All American
HQ: (305) 621-8282

Axis: Components, Inc.
HQ: (800) 556-0225

Future Electronics
HQ: (514) 594-7710

Interface Electronics
HQ: (800) 632-7792

Please contact your rep to locate a distributor near you

**SALES OFFICES**

**HEADQUARTERS**
Alliance Semiconductor
San Jose, CA
(408) 383-4900

**NORTHEAST AREA**
Alliance Semiconductor
Boston, MA
(617) 239-8127

**TECHNICAL CENTER**

**TAIWAN**
Alliance Semiconductor



**ALLIANCE SEMICONDUCTOR**
3099 North First Street San Jose, CA 95134 Tel (408) 383-4900 Fax (408) 383-4999 www.alsc.com



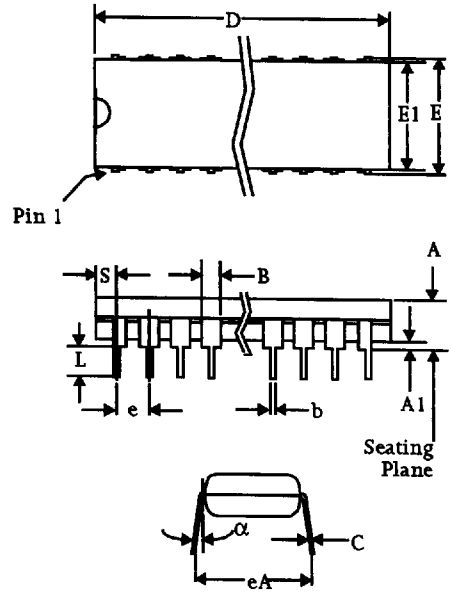
June 1996

Package diagrams

## Plastic dual in-line package (PDIP)

| | 20-pin 300 mil | | 28-pin 300 mil | | 32-pin 300 mil | | 32-pin 400 mil | |
|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max |
| A | - | 0.175 | - | 0.175 | - | 0.180 | - | 0.200 |
| A1 | 0.010 | - | 0.010 | - | 0.015 | - | 0.015 | - |
| B | 0.046 | 0.054 | 0.058 | 0.064 | 0.045 | 0.055 | 0.045 | 0.065 |
| b | 0.018 | 0.024 | 0.016 | 0.022 | 0.015 | 0.021 | 0.014 | 0.022 |
| C | 0.008 | 0.014 | 0.008 | 0.014 | 0.008 | 0.012 | 0.009 | 0.015 |
| D | - | 0.980 | - | 1.400 | - | 1.571 | - | 1.620 |
| E | 0.290 | 0.310 | 0.295 | 0.320 | 0.300 | 0.325 | 0.390 | 0.425 |
| E1 | 0.263 | 0.293 | 0.278 | 0.298 | 0.280 | 0.295 | 0.340 | 0.390 |
| e | 0.100 BSC | | 0.100 BSC | | 0.100 BSC | | 0.100 BSC | |
| eA | 0.310 | 0.350 | 0.330 | 0.370 | 0.330 | 0.370 | 0.430 | 0.470 |
| L | 0.110 | 0.130 | 0.120 | 0.140 | 0.110 | 0.142 | 0.118 | 0.162 |
| α | 0° | 15° | 0° | 15° | 0° | 15° | 0° | 15° |
| S | - | 0.040 | - | 0.055 | - | 0.043 | - | 0.065 |

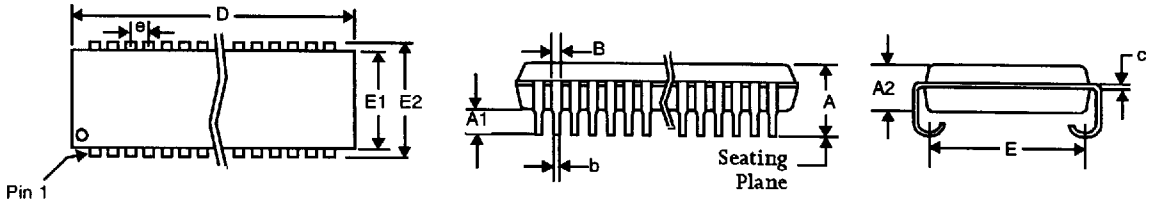
Dimensions in inches




## Plastic small outline J-bend (SOJ)

| | 20/26-pin 300 mil | | 28-pin 300 mil | | 32-pin 300 mil | | 28-pin 400 mil | | 32-pin 400 mil | | 36-pin 400 mil | | 40-pin 400 mil | | 42-pin 400 mil | | 44-pin 400 mil | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| A | - | 0.140 | - | 0.140 | - | 0.145 | 0.132 | 0.146 | - | 0.145 | - | - | - | 0.145 | 0.128 | 0.148 | 0.128 | 0.148 |
| A1 | 0.020 | - | 0.025 | - | 0.025 | - | 0.062 | - | 0.025 | - | - | - | 0.025 | - | 0.025 | - | 0.025 | - |
| A2 | 0.095 | 0.105 | 0.095 | 0.105 | 0.086 | 0.105 | 0.105 | 115 | 0.086 | 0.115 | 0.102 NOM | | 0.086 | 0.115 | 1.105 | 1.115 | 1.105 | 1.115 |
| B | 0.025 | 0.032 | 0.028 TYP | | 0.026 | 0.032 | 0.024 | 0.032 | 0.026 | 0.032 | - | 0.032 | 0.026 | 0.032 | 0.026 | 0.032 | 0.026 | 0.032 |
| b | 0.016 | 0.022 | 0.018 TYP | | 0.014 | 0.020 | 0.013 | 0.021 | 0.015 | 0.020 | 0.013 | 0.021 | 0.015 | 0.022 | 0.015 | 0.020 | 0.015 | 0.020 |
| c | 0.008 | 0.014 | 0.010 TYP | | 0.006 | 0.013 | 0.005 | 0.012 | 0.007 | 0.013 | - | - | 0.007 | 0.014 | 0.007 | 0.013 | 0.007 | 0.013 |
| D | - | 0.686 | - | 0.730 | 0.820 | 0.830 | 0.720 | 0.729 | 0.820 | 0.830 | 0.920 | 0.930 | 1.015 | 1.035 | 1.070 | 1.080 | 1.120 | 1.130 |
| E | 0.327 | 0.347 | 0.327 | 0.347 | 0.330 | 0.340 | 0.430 | 0.440 | 0.435 | 0.445 | 0.350 | 0.390 | 0.435 | 0.445 | 0.370 NOM | | 0.370 NOM | |
| E1 | 0.295 | 0.305 | 0.295 | 0.305 | 0.292 | 0.305 | 0.395 | 0.405 | 0.395 | 0.405 | 0.400 NOM | | 0.395 | 0.405 | 0.395 | 0.405 | 0.395 | 0.405 |
| E2 | 0.245 | 0.285 | 0.245 | 0.285 | 0.250 | 0.275 | 0.354 | 0.378 | 0.360 | 0.380 | 0.435 | 0.445 | 0.348 | 0.390 | 0.435 | 0.445 | 0.435 | 0.445 |
| e | 0.050 BSC | | 0.050 BSC | | 0.050 BSC | | 0.050 BSC | | 0.050 BSC | | 0.045 | 0.055 | 0.050 BSC | | 0.050 NOM | | 0.050 NOM | |

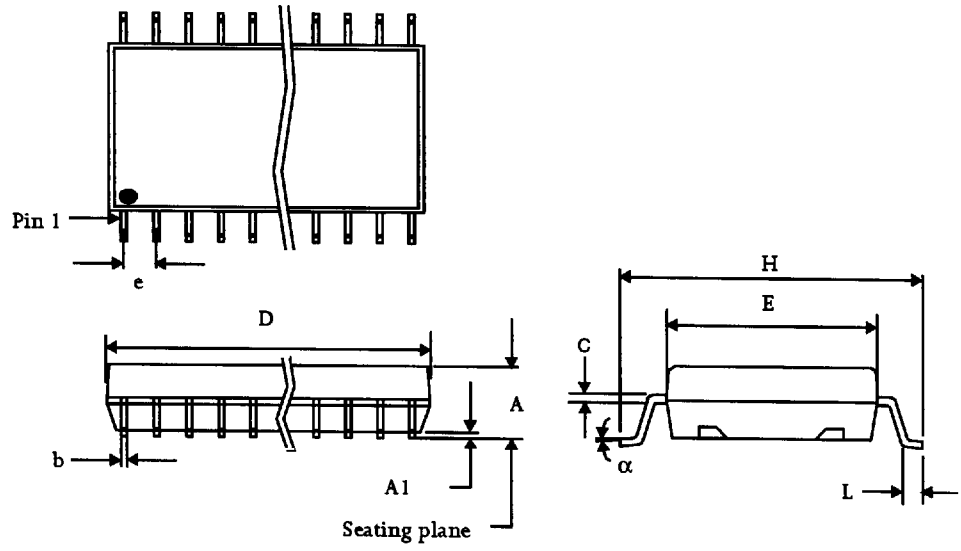
Dimensions in inches



## Plastic small outline gull wing IC (SOIC)

| | 28-pin 330 mil | |
|---|---|---|
| | Min | Max |
| A | - | 0.112 |
| A1 | 0.004 | - |
| b | 0.014 | 0.020 |
| C | 0.008 | 0.014 |
| D | - | 0.733 |
| e | 0.050 nominal | |
| E | 0.326 | 0.336 |
| H | 0.453 | 0.477 |
| L | 0.028 | 0.044 |
| α | 0° | 10° |

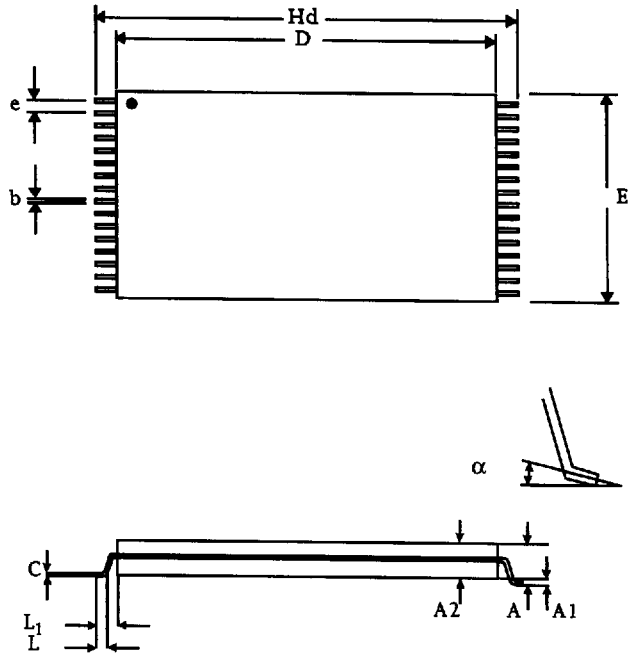
Dimensions in inches

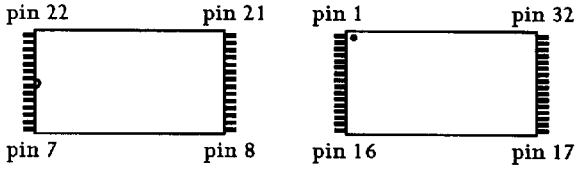



## Thin small outline package (TSOP-I)

| | 28-pin 8×13.4 | | 32-pin 8×20 | | 40-pin 10×20 | |
|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | Min | Max |
| A | - | 1.20 | - | 1.20 | - | 1.20 |
| A1 | 0.05 | 0.15 | 0.05 | 0.15 | 0.05 | 0.15 |
| A2 | 0.90 | 1.05 | 0.90 | 1.05 | 0.95 | 1.05 |
| b | 0.17 | 0.27 | 0.17 | 0.23 | 0.17 | 0.27 |
| C | 0.10 | - | 0.10 | - | 0.10 | 0.20 |
| D | 11.70 | 11.90 | 18.20 | 18.60 | 18.30 | 18.50 |
| e | 0.55 nominal | | 0.50 nominal | | 0.50 nominal | |
| E | 8.0 nominal | | 7.80 | 8.20 | 9.90 | 10.10 |
| Hd | 13.20 | 13.60 | 19.80 | 20.20 | 19.80 | 20.20 |
| L | 0.30 | 0.70 | 0.40 | 0.60 | 0.50 | 0.70 |
| α | 0° | 5° | 1° | 5° | 0° | 5° |

Dimensions in millimeters




28-pin 32-pin