January 2001 **Advance Information**



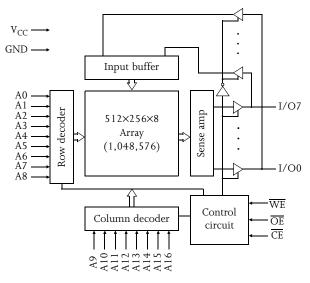
AS7C1025A AS7C31025A

5V/3.3V 128K X 8 CMOS SRAM (Revolutionary pinout)

Features

- AS7C1025A (5V version)
- AS7C31025A (3.3V version)
- Industrial and commercial temperatures
- Organization: 131,072 x 8 bits
- High speed
 - 10/10/12/15/20 ns address access time
- 3/3/4/5 ns output enable access time
- Low power consumption: ACTIVE
 - 660 mW (AS7C1025A) / max @ 10 ns (5V)
 - 324 mW (AS7C31025A) / max @ 10 ns (3.3V)
- Low power consumption: STANDBY
 - 55 mW (AS7C1025A) / max CMOS (5V)
 - 36 mW (AS7C31025A) / max CMOS (3.3V)

Logic block diagram



Selection guide

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		AS7C1025A-10 AS7C31025A-10	AS7C1025A-12 AS7C31025A-12	AS7C1025A-15 AS7C31025A-15	AS7C1025A-20 AS7C31025A-20	Unit
Maximum addre	ess access time	10	12	15	20	ns
Maximum outpu time	ıt enable access	3	3	4	5	ns
Maximum	AS7C1025A	120	110	100	100	mA
operating current	AS7C31025A	90	80	80	80	mA
Maximum	AS7C1025A	10	10	10	15	mA
CMOS standby current	AS7C31025A	10	10	10	15	mA

Latest 6T 0.25u CMOS technology

- 2.0V data retention
- Easy memory expansion with \overline{CE} , \overline{OE} inputs
- Center power and ground
- TTL/LVTTL-compatible, three-state I/O
- JEDEC-standard packages
- 32-pin, 300 mil SOJ
- 32-pin, 400 mil SOJ
- 32-pin, TSOP II
- ESD protection \geq 2000 volts
- Latch-up current ≥ 200 mA

Pin arrangement

32-pin A0 1 A1 2 A2 3 A3 4 CE 5 I/O0 6 I/O1 7 V _{CC} 8 9 I/O2 10 I/O3 11 WE 12 A4 13 A5 14 A6 15 A7 16	A15 32 A16 31 A17 30 A14 28 05 27 107 28 05 27 107 28 05 27 107 28 05 27 107 29 A13 28 05 27 107 29 413 28 05 27 107 25 415 30 05 27 107 25 415 30 05 27 107 25 415 30 05 27 107 25 415 30 05 27 107 25 40 107 25 40 107 25 107 27 107 27 107 27 107 27 107 27 107 27 107 27 107 27 107 27 107 27 107 27 107 27 20 107 27 20 107 27 20 107 27 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 107 20 20 20 107 20 20 20 20 20 20 20 20 20 20
32-pin S 32-pin S A0 1 A1 2 A2 3 A3 4 CE 6 I/O1 7 V _{CC} 8 GND 9 I/O2 10 I/O3 11 WE 12 A4 11 V _{CE} 12 A4 15 A7 16	OJ (300 mil) OJ (400 mil) 32 A16 31 A15 30 A14 29 D 02 28 D 1007 28 D 1007 28 D 1007 20 D 1007 2

2/6/01; V.0.9

Functional description

The AS7C1025A and AS7C31025A are high-performance CMOS 1,048,576-bit Static Random Access Memory (SRAM) devices organized as 131,072 x 8 bits. They are designed for memory applications where fast data access, low power, and simple interfacing are desired.

Equal address access and cycle times (t_{AA} , t_{RC} , t_{WC}) of 10/12/15/20 ns with output enable access times (t_{OE}) of 3/3/4/5 ns are ideal for high-performance applications. The chip enable input \overline{CE} permits easy memory and expansion with multiple-bank memory systems.

When \overline{CE} is high the devices enter standby mode. The standard AS7C1025A is guaranteed not to exceed 55 mW power consumption in standby mode. Both devices also offer 2.0V data retention.

A write cycle is accomplished by asserting write enable (\overline{WE}) and chip enable (\overline{CE}). Data on the input pins I/O0-I/O7 is written on the rising edge of \overline{WE} (write cycle 1) or \overline{CE} (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 chip enable (\overline{OE}), with write enable (\overline{WE}) high. The chips drive 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 operation is from a single 5V supply (AS7C1025A) or 3.3V supply (AS7C31025A). The AS7C1025A and AS7C31025A are packaged in common industry standard packages.

Absolute maximum ratings

Parameter	Device	Symbol	Min	Max	Unit
Voltage on V _{CC} relative to GND	AS7C1025A	V _{t1}	-0.50	+7.0	V
voltage on v _{CC} relative to GIVD	AS7C31025A	V _{t1}	-0.50	+5.0	V
Voltage on any pin relative to GND		V _{t2}	-0.50	$V_{CC} + 0.5$	V
Power dissipation	_	P _D	_	1.0	W
Storage temperature (plastic)		T _{stg}	-65	+150	°C
Ambient temperature with V_{CC} applied	_	T _{bias}	-55	+125	°C
DC current into outputs (low)	_	I _{OUT}	_	20	mA

NOTE: 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

CE	WE	ŌĒ	Data	Mode
Н	Х	Х	High Z	Standby (I _{SB} , I _{SB1})
L	Н	Н	High Z	Output disable (I _{CC})
L	Н	L	D _{OUT}	Read (I _{CC})
L	L	Х	D _{IN}	Write (I _{CC})

Key: X = Don't Care, L = Low, H = High

Recommended operating conditions

Parameter	Device	Symbol	Min	Nominal	Max	Unit
Supply voltage	AS7C1025A	V _{CC}	4.5	5.0	5.5	V
Supply voltage	AS7C31025A	V _{CC}	3.0	3.3	3.6	V
	AS7C1025A	V _{IH}	2.2	-	$V_{CC} + 0.5$	V
Input voltage	AS7C31025A	V _{IH}	2.0	_	$V_{CC} + 0.5$	V
	Both	V _{IL} †	-0.5	-	0.8	V
Ambient operating temperature	commercial	T _A	0	_	70	°C
	industrial	T _A	-40	-	85	°C

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 $\overline{1}_{V_{IL} \text{ min.}} = -3.0 \text{V}$ for pulse width less than $t_{RC}/2$.

DC operating characteristics (over the operating range) I

	8		8 8/	-1	0	-1	2	-1	5	-2	20	
Parameter	Sym	Test conditions	Device	Min	Max	Min	Max	Min	Max	Min	Max	Unit
Input leakage current	I _{LI}	$V_{CC} = Max$, $V_{IN} = GND$ to V_{CC}	Both	_	1	_	1	_	1	-	1	μA
Output leakage current	I _{lo}	$V_{CC} = Max, \overline{CE} = V_{IH}, V_{out} = GND$ to V_{CC}	Both	_	1	_	1	_	1	_	1	μА
Operating			AS7C1025A	-	120	_	110	-	100	-	100	
power supply current	I _{CC}	$\overline{\text{CE}} = \text{V}_{\text{IL}}, \text{ f} = \text{f}_{\text{Max}}, \text{I}_{\text{OUT}} = 0 \text{ mA}$	AS7C31025A	_	90	_	80	_	80	_	80	mA
Standby	I _{SB}	$\overline{\text{CE}} = \text{V}_{\text{IH}}, \text{ f} = \text{f}_{\text{Max}}, \text{ f}_{\text{OUT}} = 0$	AS7C1025A	-	30	_	25	-	20	-	20	mA
power	¹ SB	$CL = V_{IH}$, $I = I_{Max}$, $I_{OUT} = 0$	AS7C31025A	-	30	-	25	-	20	-	20	1117.
supply current ¹	I	$\overline{\text{CE}} \geq \text{V}_{\text{CC}}0.2\text{V},\text{V}_{\text{IN}} \leq 0.2\text{V} \text{ or }\text{V}_{\text{IN}}$	AS7C1025A	-	10	-	10	-	10	-	15	mA
current	I _{SB1}	\geq V _{CC} –0.2V, f = 0, f _{OUT} = 0	AS7C31025A	-	10	-	10	-	10	-	15	1117.
Output	V _{OL}	$I_{OL} = 8 \text{ mA}, V_{CC} = \text{Min}$	AS7C1025A	-	.04	-	0.4	-	0.4	-	0.4	V
voltage	V _{OH}	$I_{OH} = -4 \text{ mA}, V_{CC} = \text{Min}$	AS7C31025A	2.4		2.4	-	2.4	-	2.4	-	V
		$V_{CC} = 2.0V$	AS7C1025A	_	1	_	1	_	1		5	mA
Data retention current	I _{CCDR}	$\label{eq:VCC} \begin{split} \overline{\mathrm{CE}} &\geq \mathrm{V}_{\mathrm{CC}} - 0.2 \mathrm{V} \\ \mathrm{V}_{\mathrm{IN}} &\geq \mathrm{V}_{\mathrm{CC}} - 0.2 \mathrm{V} \text{ or} \\ \mathrm{V}_{\mathrm{IN}} &\leq 0.2 \mathrm{V} \end{split}$	AS7C31025A	_	1	_	1	_	1	_	5	mA

Capacitance (f = 1 MHz, $T_a = 25$ °C, $V_{CC} = \text{NOMINAL})^2$

Parameter	Symbol	Signals	Test conditions	Max	Unit
Input capacitance	C _{IN}	A, CE, WE, OE	$V_{IN} = 0V$	5	pF
I/O capacitance	C _{I/O}	I/O	$V_{IN} = V_{OUT} = 0V$	7	pF

		-1	l 0	-1	2	-1	15	-2	20		
Parameter	Symbol	Min	Max	Min	Max	Min	Max	Min	Max	Unit	Notes
Read cycle time	t _{RC}	10	-	12	-	15	_	20	—	ns	
Address access time	t _{AA}	-	10	-	12	-	15	-	20	ns	3
Chip enable $\overline{(CE)}$ access time	t _{ACE}	-	10	-	12	-	15	-	20	ns	3
Output enable (OE) access time	t _{OE}	-	3	-	3	-	4	-	5	ns	
Output hold from address change	t _{OH}	2	-	3	-	3	-	3	—	ns	5
CE Low to output in low Z	t _{CLZ}	0	-	0	-	0	-	0	—	ns	4,5
CE Low to output in high Z	t _{CHZ}	-	3	—	3	-	4	-	5	ns	4,5
OE Low to output in low Z	t _{OLZ}	0	-	0	-	0	-	0	—	ns	4,5
OE High to output in high Z	t _{OHZ}	-	3	-	3	-	4	-	5	ns	4,5
Power up time	t _{PU}	0	-	0	-	0	_	0	_	ns	4,5
Power down time	t _{PD}	-	10	_	12	_	15	_	20	ns	4,5
Rising input		t _{RC}	g input					ed/don't	care		
Rising input Read waveform 1 (address cor Address	trolled) ^{3,4}	6,7,9 t _{RC}		Da	ta valid	t _{OH}		ed/don't	care		
Address D _{OUT} Read waveform 2 (CE and OE	trolled) ^{3,}	6,7,9 t _{RC}		Da	•	t _{OH}		ed/don't	care		
Rising input Read waveform 1 (address cor Address	trolled) ^{3,4}	6,7,9 t _{RC}		Da	•	t _{OH}		ed/don't	care		
Rising input Read waveform 1 (address cor Address D _{OUT} Read waveform 2 (CE and OE	trolled) ^{3,}	6,7,9 t _{RC}		Da	•	t _{OH}		ed/don't	care		
Rising input Read waveform 1 (address cor Address D _{OUT} Read waveform 2 (CE and OE	trolled) ^{3,}	6,7,9 t _{RC}		Da	•	t _{OH}		ed/don't	care		
Rising input Read waveform 1 (address cor Address D _{OUT} Read waveform 2 (CE and OE CE	trolled) ^{3,}	6,7,9 t _{RC}	9		ta valid	t _{OH}		ed/don't	care		
Rising input Read waveform 1 (address cor Address D _{OUT} Read waveform 2 (CE and OE CE OE	trolled) ^{3,}	6,7,9 t _{RC}	9	Data val	ta valid	. ^t он		ed/don't	care		

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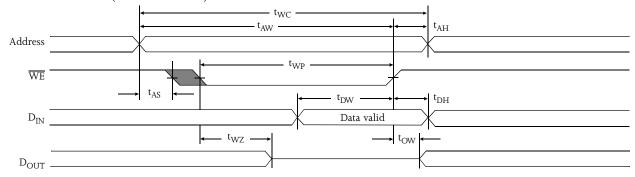
Read cycle (over the operating range)^{3,9}

2/6/01; V.0.9

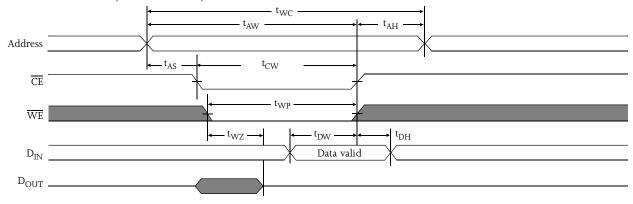
	0 0 /	-1	0	-12		-15		-20			
Parameter	Symbol	Min	Max	Min	Max	Min	Max	Min	Max	Unit	Notes
Write cycle time	t _{WC}	10		12	-	15	_	20	_	ns	
Chip enable (\overline{CE}) to write end	t _{CW}	8		10	_	12	_	12	_	ns	
Address setup to write end	t _{AW}	8		9	_	10	_	12	_	ns	
Address setup time	t _{AS}	0		0	_	0	_	0	_	ns	
Write pulse width	t _{WP}	7		8	_	9	_	12	_	ns	
Address hold from end of write	t _{AH}	0		0	_	0	_	0	_	ns	
Data valid to write end	t _{DW}	5		6	_	8	_	10	_	ns	
Data hold time	t _{DH}	0		0	_	0	_	0	_	ns	4,5
Write enable to output in high Z	t _{WZ}		6	_	6	_	6	_	8	ns	4,5
Output active from write end	t _{OW}	1		1	_	1	_	2	_	ns	4,5

Write cycle (over the operating range)¹¹

Write waveform 1 ($\overline{\text{WE}}$ controlled)^{10,11}



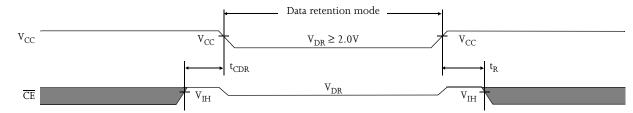
Write waveform 2 ($\overline{\text{CE}}$ controlled)^{10,11}



Data retention characteristics (over the operating range)

Parameter	Symbol	Test conditions	Min	Max	Unit
V _{CC} for data retention	V _{DR}	V = 2.0 V	2.0	_	v
Data retention current	I _{CCDR}	$V_{CC} = 2.0V$	_	500	μΑ
Chip enable to data retention time	t _{CDR}	$\overline{\text{CE}} \ge \text{V}_{\text{CC}} - 0.2\text{V}$	0	-	ns
Operation recovery time	t _R	$V_{IN} \ge V_{CC} - 0.2V$ or $V_{IN} \le 0.2V$	t _{RC}	-	ns
Input leakage current	I _{LI}	· IN = 0.2 (_	1	μΑ

Data retention waveform



AC test conditions

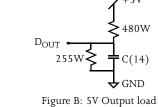
+3.0V

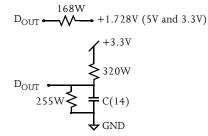
GND

- Output load: see Figure B or Figure C.
- Input pulse level: GND to 3.0V. See Figure A.
- Input rise and fall times: 2 ns. See Figure A.
- Input and output timing reference levels: 1.5V.

2 ns

Figure A: Input pulse





Thevenin equivalent:

Figure C: 3.3V Output load

Notes

1 During V_{CC} power-up, a pull-up resistor to V_{CC} on \overline{CE} is required to meet I_{SB} specification.

90%

10%

2 This parameter is sampled, but not 100% tested.

90%

10%

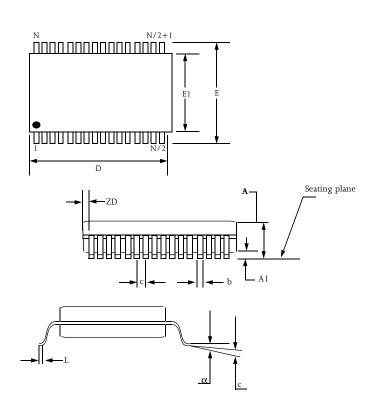
- 3 For test conditions, see AC Test Conditions, Figures A, B, and C.
- $4 = t_{CLZ}$ and t_{CHZ} are specified with CL = 5pF, as in Figure C. Transition is measured ± 500 mV from steady-state voltage.
- 5 This parameter is guaranteed, but not 100% tested.
- $6 \quad \overline{\text{WE}} \text{ is High for read cycle.}$
- 7 $\overline{\text{CE}}$ and $\overline{\text{OE}}$ are Low for read cycle.
- 8 Address valid prior to or coincident with CE transition Low.
- 9 All read cycle timings are referenced from the last valid address to the first transitioning address.
- $10 \quad \overline{\text{CE}} \text{ or } \overline{\text{WE}} \text{ must be High during address transitions. Either } \overline{\text{CE}} \text{ or } \overline{\text{WE}} \text{ asserting high terminates a write cycle.}$
- 11 All write cycle timings are referenced from the last valid address to the first transitioning address.

12 NA.

13 C=30pF, except all high Z and low Z parameters, where C=5pF.

Package dimensions

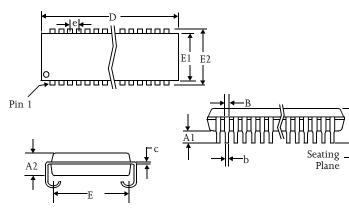
32-pin TSOP II



	32-pin TSOP II (mm)							
Symbol	Min	Max						
А	_	1.2						
A1	0.05	0.15						
b	0.3	0.52						
С	0.12	0.21						
D	20.82	21.08						
E1	10.03	10.29						
E	11.56	11.96						
е	1.27	BSC						
L	0.40	0.60						
ZD	0.95	REF.						
α	0°	5°						

R,





	-	n SOJ mil	32-pin SOJ 400 mil		
Symbol	Min	Max	Min	Max	
Α	-	0.145	-	0.145	
A1	0.025	-	0.025	-	
A2	0.086	0.105	0.086	0.115	
В	0.026	0.032	0.026	0.032	
b	0.014	0.020	0.015	0.020	
С	0.006	0.013	0.007	0.013	
D	0.820	0.830	0.820	0.830	
E	0.250	0.275	0.360	0.380	
E1	0.292	0.305	0.395	0.405	
E2	0.330	0.340	0.435	0.445	
e	0.050) BSC	0.050 BSC		

Ordering codes

Package \ Access time	Voltage	Temperature	10 ns	12 ns	15 ns	20 ns
TSOP II	5V	Commercial	AS7C1025A-10TC	AS7C1025A-12TC	AS7C1025A-15TC	AS7C1025A-20TC
		Industrial	AS7C1025A-10TI	AS7C1025A-12TI	AS7C1025A-15TI	AS7C1025A-20TI
	3.3V	Commercial	AS7C31025A-10TC	AS7C31025A-12TC	AS7C31025A-15TC	AS7C31025A-20TC
		Industrial	AS7C31025A-10TI	AS7C31025A-12TI	AS7C31025A-15TI	AS7C31025A-20TI
300-mil SOJ	5V	Commercial	AS7C1025A-10TJC	AS7C1025A-12TJC	AS7C1025A-15TJC	AS7C1025A-20TJC
		Industrial	AS7C1025A-10TJI	AS7C1025A-12TJI	AS7C1025A-15TJI	AS7C1025A-20TJI
	3.3V	Commercial	AS7C31025A-10TJC	AS7C31025A-12TJC	AS7C31025A-15TJC	AS7C31025A-20TJC
		Industrial	AS7C31025A-10TJI	AS7C31025A-12TJI	AS7C31025A-15TJI	AS7C31025A-20TJI
400-mil SOJ	5V	Commercial	AS7C1025A-10JC	AS7C1025A-12JC	AS7C1025A-15JC	AS7C1025A-20JC
	51	Industrial	AS7C1025A-10JI	AS7C1025A-12JI	AS7C1025A-15JI	AS7C1025A-20JI
	3.3V	Commercial	AS7C31025A-10JC	AS7C31025A-12JC	AS7C31025A-15JC	AS7C31025A-20JC
		Industrial	AS7C31025A-10JI	AS7C31025A-12JI	AS7C31025A-15JI	AS7C31025A-20JI

R,

Part numbering system

AS7C	х	1025	-XX	X	Х
SRAM prefix	Blank=5V CMOS 3=3.3V CMOS	Device number	Access time		Temperature range C = Commercial, 0°C to 70°C I = Industrial, -40°C to 85°C

Alliance Semiconductor

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