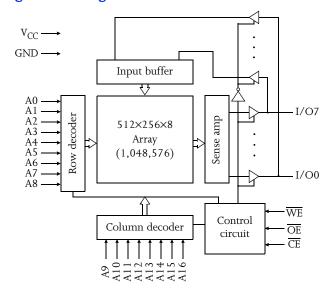


## 5V/3.3V 128K X 8 CMOS SRAM (Revolutionary pinout)

#### **Features**

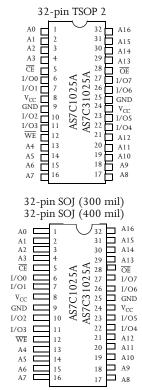
- AS7C1025A (5V version)
- AS7C31025A (3.3V version)
- Industrial and commercial temperatures
- Organization: 131,072 x 8 bits
- High speed
- 10/12/15/20 ns address access time
- 5, 6, 7, 8 ns output enable access time
- Low power consumption: ACTIVE
- 660 mW (AS7C1025A) / max @ 10 ns (5V)
- 324 mW (AS7C31025A) / 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



- Latest 6T 0.25u CMOS technology
- Easy memory expansion with  $\overline{\text{CE}}$ ,  $\overline{\text{OE}}$  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 2
- ESD protection ≥ 2000 volts
- Latch-up current ≥ 200 mA

### Pin arrangement



## **Selection guide**

		-10	-12	-15	-20	Unit
Maximum address access time		10	12	15	20	ns
Maximum output enable access time		5	6	7	8	ns
Maximum operating current	AS7C1025A	120	110	100	100	mA
	AS7C31025A	90	80	80	80	mA
Maximum CMOS	AS7C1025A	10	10	10	10	mA
standby current	AS7C31025A	10	10	10	10	mA



### **Functional description**

The AS7C1025A and AS7C31025A are high-performance CMOS 1,048,576-bit Static Random Access Memory (SRAM) devices organized as  $131,072 \times 8$  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 5, 6, 7, 8 ns are ideal for high-performance applications. The chip enable input  $\overline{CE}$  permits easy memory and expansion with multiple-bank memory systems.

When  $\overline{\text{CE}}$  is high the devices enter standby mode. The standard AS7C1025A is guaranteed not to exceed 55 mW power consumption in standby mode.

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  $(\overline{CE})$ , 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 ver relative to divid	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		$P_{\mathrm{D}}$	_	1.0	W
Storage temperature (plastic)		T <sub>stg</sub>	-65	+150	°C
Ambient temperature with V <sub>CC</sub> applied		$T_{ m bias}$	-55	+125	°C
DC current into outputs (low)		I <sub>OUT</sub>	=	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

<del>CE</del>	WE	<del>OE</del>	Data	Mode
Н	X	X	High Z	Standby (I <sub>SB</sub> , I <sub>SB1</sub> )
L	Н	Н	High Z	Output disable (I <sub>CC</sub> )
L	Н	L	$D_{OUT}$	Read (I <sub>CC</sub> )
L	L	X	$D_{\mathrm{IN}}$	Write (I <sub>CC</sub> )

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



# **Recommended operating conditions**

Parameter	Device	Symbol	Min	Nominal	Max	Unit
Supply voltage	AS7C1025A	V <sub>CC</sub>	4.5	5.0	5.5	V
Supply voltage	AS7C31025A	V <sub>CC</sub>	3.0	3.3	3.6	V
	AS7C1025A	V <sub>IH</sub>	2.2	_	$V_{CC} + 0.5$	V
Input voltage	AS7C31025A	V <sub>IH</sub>	2.0	_	$V_{CC} + 0.5$	V
	Both	$V_{\rm IL}^{\dagger}$	-0.5	_	0.8	V
Ambient operating temperature	commercial	$T_A$	0	_	70	°C
Ambient operating temperature	industrial	$T_A$	-40	_	85	°C

 $<sup>\</sup>dagger_{V_{IL} \text{ min.}} = -3.0 \text{V for pulse width less than } t_{RC}/2.$ 

# DC operating characteristics (over the operating range) $^{I}$

				-1	10	-1	12	-1	15	-7	20	
Parameter	Sym	<b>Test conditions</b>	Device	Min	Max	Min	Max	Min	Max	Min	Max	Unit
Input leakage current	I <sub>LI</sub>	$V_{CC} = Max$ , $V_{IN} = GND$ to $V_{CC}$	Both	_	1	_	1	-	1	_	1	μА
Output leakage current	I <sub>LO</sub>	$V_{CC} = Max$ , $\overline{CE} = V_{IH}$ , $V_{out} = GND$ to $V_{CC}$	Both	-	1	_	1	-	1	-	1	μА
Operating			AS7C1025A	_	120	_	110	_	100	_	100	
power supply current	$I_{CC}$	$\overline{\text{CE}} = V_{\text{IL}}$ , $f = f_{\text{Max}}$ , $I_{\text{OUT}} = 0 \text{ mA}$	AS7C31025A	_	90	_	80	-	80	_	80	mA
Standby	I <sub>SB</sub>	$\overline{\text{CE}} = V_{\text{IH}}, f = f_{\text{Max}}, f_{\text{OUT}} = 0$	AS7C1025A	_	30	_	25	_	20	_	20	mA
power	1SB	$CE = V_{IH}, I = I_{Max}, I_{OUT} = 0$	AS7C31025A	_	30	_	25	_	20	-	20	ША
supply 1	Τ.	$\overline{\text{CE}} \ge \text{V}_{\text{CC}} - 0.2\text{V}, \text{V}_{\text{IN}} \le 0.2\text{V or V}_{\text{IN}}$	AS7C1025A	_	10		10		10		10	mA
current <sup>1</sup> Is	$I_{SB1}$	$\geq$ V <sub>CC</sub> -0.2V, f = 0, f <sub>OUT</sub> = 0	AS7C31025A	1	10		10		10		10	ША
Output	$v_{OL}$	$I_{OL} = 8 \text{ mA}, V_{CC} = \text{Min}$	Both	-	.04	_	0.4	_	0.4	_	0.4	V
voltage	V <sub>OH</sub>	$I_{OH} = -4 \text{ mA}, V_{CC} = \text{Min}$	DOUI	2.4		2.4	_	2.4	_	2.4	_	V

# Capacitance (f = 1 MHz, $T_a$ = 25 °C, $V_{CC}$ = NOMINAL)<sup>2</sup>

Parameter	Symbol Signals		<b>Test conditions</b>	Max	Unit
Input capacitance	$C_{IN}$	A, $\overline{\text{CE}}$ , $\overline{\text{WE}}$ , $\overline{\text{OE}}$	$V_{IN} = 0V$	5	pF
I/O capacitance	$C_{\rm I/O}$	I/O	$V_{IN} = V_{OUT} = 0V$	7	pF



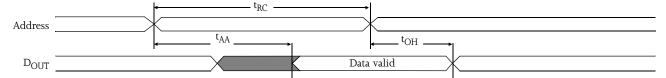
# Read cycle (over the operating range)<sup>3,9</sup>

		-10		-12		-15		-20			
Parameter	Symbol	Min	Max	Min	Max	Min	Max	Min	Max	Unit	Notes
Read cycle time	t <sub>RC</sub>	10	-	12	_	15	-	20	-	ns	
Address access time	t <sub>AA</sub>	_	10	-	12	-	15	1	20	ns	3
Chip enable $(\overline{CE})$ access time	t <sub>ACE</sub>	-	10	-	12	-	15	-	20	ns	3
Output enable (OE) access time	t <sub>OE</sub>	_	5	-	6	-	7	1	8	ns	
Output hold from address change	t <sub>OH</sub>	2	-	3	_	3	-	3	-	ns	5
CE Low to output in low Z	t <sub>CLZ</sub>	0	_	0	-	0	-	0	_	ns	4, 5
CE Low to output in high Z	t <sub>CHZ</sub>	-	3	-	3	ı	4	1	5	ns	4, 5
OE Low to output in low Z	t <sub>OLZ</sub>	0	-	0	_	0	-	0	-	ns	4, 5
OE High to output in high Z	t <sub>OHZ</sub>	-	3	-	3	-	4	-	5	ns	4, 5
Power up time	t <sub>PU</sub>	0	_	0	_	0	_	0	-	ns	4, 5
Power down time	t <sub>PD</sub>	_	10	ı	12	_	15	-	20	ns	4, 5

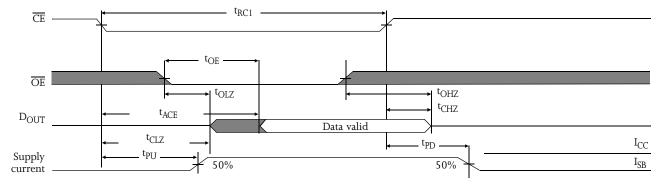
# Key to switching waveforms



# Read waveform 1 (address controlled)<sup>3,6,7,9</sup>



# Read waveform 2 (CE and OE controlled)<sup>3,6,8,9</sup>

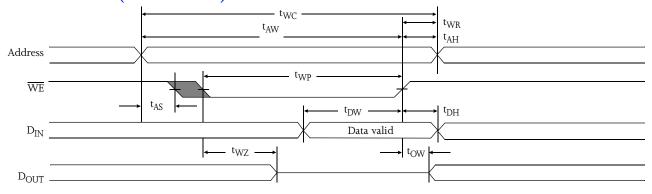




# Write cycle (over the operating range) $^{II}$

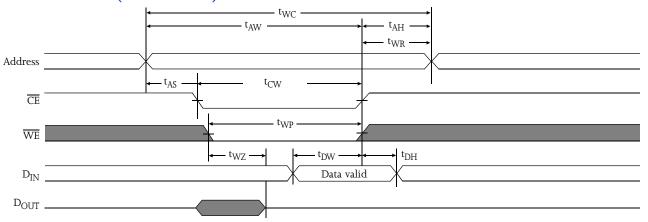
		-1	-10 -12		12	-15		-20			
Parameter	Symbol	Min	Max	Min	Max	Min	Max	Min	Max	Unit	Notes
Write cycle time	t <sub>WC</sub>	10	_	12	-	15	-	20	-	ns	
Chip enable $(\overline{CE})$ to write end	t <sub>CW</sub>	8	_	10	-	12	-	12	-	ns	
Address setup to write end	t <sub>AW</sub>	8	_	9	-	10	-	12	_	ns	
Address setup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

# Write waveform 1 ( $\overline{\text{WE}}$ controlled)<sup>10,11</sup>





## Write waveform 2 ( $\overline{\text{CE}}$ controlled)<sup>10,11</sup>



### **AC test conditions**

- 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.

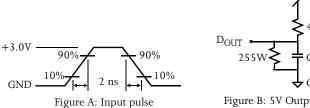


Figure B: 5V Output load

#### Thevenin equivalent:

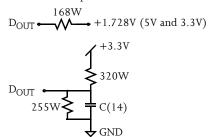


Figure C: 3.3V Output load

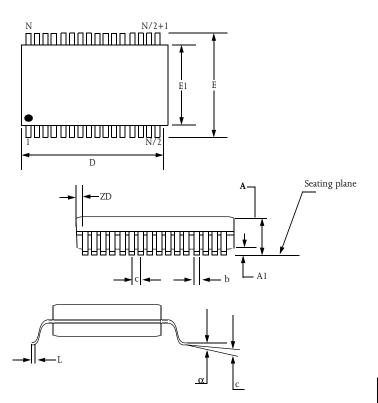
#### **Notes**

- During  $V_{CC}$  power-up, a pull-up resistor to  $V_{CC}$  on  $\overline{CE}$  is required to meet  $I_{SB}$  specification.
- This parameter is sampled, but not 100% tested. 2
- For test conditions, see AC Test Conditions, Figures A, B, and C.
- $t_{\text{CIZ}}$  and  $t_{\text{CHZ}}$  are specified with CL = 5pF, as in Figure C. Transition is measured  $\pm 500 \, \text{mV}$  from steady-state voltage.
- This parameter is guaranteed, but not 100% tested.
- WE is High for read cycle.
- $\overline{\text{CE}}$  and  $\overline{\text{OE}}$  are Low for read cycle.
- Address valid prior to or coincident with  $\overline{\text{CE}}$  transition Low.
- All read cycle timings are referenced from the last valid address to the first transitioning address.
- 10  $\overline{\text{CE}}$  or  $\overline{\text{WE}}$  must be High during address transitions. Either  $\overline{\text{CE}}$  or  $\overline{\text{WE}}$  asserting high terminates a write cycle.
- All write cycle timings are referenced from the last valid address to the first transitioning address. 11
- 12 NA.
- 13 C=30pF, except all high Z and low Z parameters, where C=5pF.



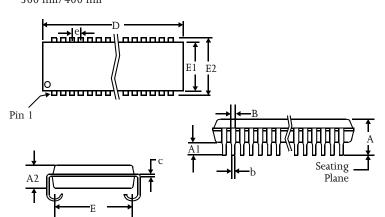
# **Package dimensions**

32-pin TSOP 2



	32-pin TSC	OP 2 (mm)
Symbol	Min	Max
A	_	1.2
<b>A</b> 1	0.05	0.15
b	0.3	0.52
C	0.12	0.21
D	20.82	21.08
<b>E</b> 1	10.03	10.29
E	11.56	11.96
e	1.27	BSC
L	0.40	0.60
ZD	0.95	REF.
α	0°	5°

32-pin SOJ 300 mil/400 mil



	-	n SOJ mil	32-pin SOJ 400 mil			
Symbol	Min	Max	Min	Max		
A	-	0.145	-	0.145		
<b>A1</b>	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		
<b>E2</b>	0.330	0.340	0.435	0.445		
e	0.050	) BSC	0.050	0 BSC		



## **Ordering codes**

Package \ Access time	Volt.	Temperature	10 ns	12 ns	15 ns	20 ns
	5V	Commercial	AS7C1025A-10HFC	AS7C1025A-12HFC	AS7C1025A-15HFC	AS7C1025A-20HFC
TSOP 2	3 4	Industrial	AS7C1025A-10TI	AS7C1025A-12HFI	AS7C1025A-15HFI	AS7C1025A-20HFI
13OF 2	3.3V	Commercial	AS7C31025A-10HFC	AS7C31025A-12HFC	AS7C31025A-15HFC	AS7C31025A-20HFC
	3.3 V	Industrial	AS7C31025A-10HFI	AS7C31025A-12HFI	AS7C31025A-15HFI	AS7C31025A-20HFI
	5V	Commercial	AS7C1025A-10TJC	AS7C1025A-12TJC	AS7C1025A-15TJC	AS7C1025A-20TJC
300-mil SOJ	3 4	Industrial	AS7C1025A-10TJI	AS7C1025A-12TJI	AS7C1025A-15TJI	AS7C1025A-20TJI
300-11111 30)	3.3V	Commercial	AS7C31025A-10TJC	AS7C31025A-12TJC	AS7C31025A-15TJC	AS7C31025A-20TJC
	3.3 V	Industrial	AS7C31025A-10TJI	AS7C31025A-12TJI	AS7C31025A-15TJI	AS7C31025A-20TJI
	5V	Commercial	AS7C1025A-10JC	AS7C1025A-12JC	AS7C1025A-15JC	AS7C1025A-20JC
400-mil SOJ	3 4	Industrial	AS7C1025A-10JI	AS7C1025A-12JI	AS7C1025A-15JI	AS7C1025A-20JI
+00-iiii 3Oj	3.3V	Commercial	AS7C31025A-10JC	AS7C31025A-12JC	AS7C31025A-15JC	AS7C31025A-20JC
	J.J V	Industrial	AS7C31025A-10JI	AS7C31025A-12JI	AS7C31025A-15JI	AS7C31025A-20JI

### Part numbering system

AS7C	X	1025	–XX	X	X
SRAM prefix	Voltage: Blank=5V CMOS 3=3.3V CMOS	Device number	Access time	Package: HF = TSOP 2 / 32 Pin TJ = SOJ 300 mil J = SOJ 400 mil	Temperature range C = Commercial, 0°C to 70°C I = Industrial, -40°C to 85°C

12/7/01; v.0.9.7

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