Document Title

32K X 8 BIT CMOS SRAM

Revision History

Rev. No.	History	Issue Date	Remark
0.0	Initial issue	June 30, 1998	Preliminary
0.1	Erase 28-pin DIP package type	May 21, 1999	
0.2	Erase 55ns part	December 1, 2000	

Preliminary

32K X 8 BIT CMOS SRAM

Features

- External Operating Voltage: 4.5V to 5.5V
- Access times: 70 ns (max.)
- Current:
  - A625308-L series: Operating: 70mA (max.)
    Standby: 100µA (max.)
  - A625308-S series: Operating: 70mA (max.)
    Standby: 25µA (max.)
- Full static operation, no clock or refreshing required
- All inputs and outputs are directly TTL compatible
- Common I/O using three-state output
- Data retention voltage: 2.0V (min.)
- Available in 28-pin SOP and TSOP (forward and reverse type) packages

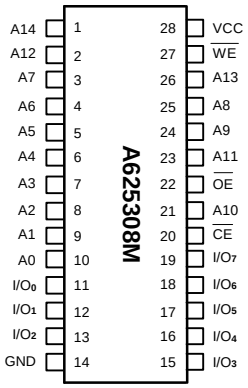
General Description

The A625308 is a low operating current 262,144-bit static random access memory organized as 32,768 words by 8 bits and operates on a single 5V power supply.
Inputs and three-state outputs are TTL compatible and allow for direct interfacing with common system bus structures.

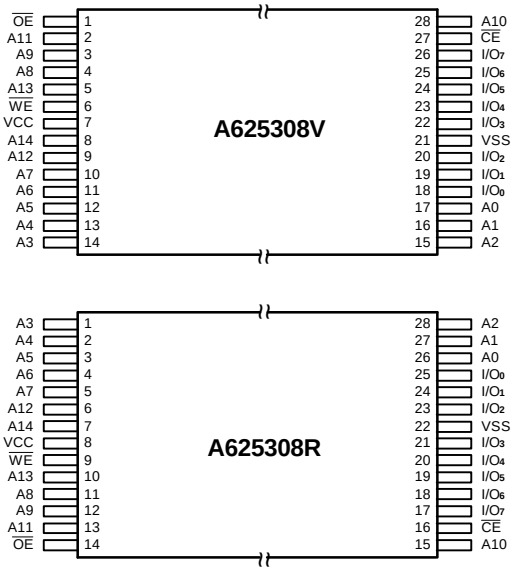
Minimum standby power is drawn by this device when $\overline{CE}$ is at a high level, independent of the other input levels.
Data retention is guaranteed at a power supply voltage as low as 2.0V.

Pin Configurations

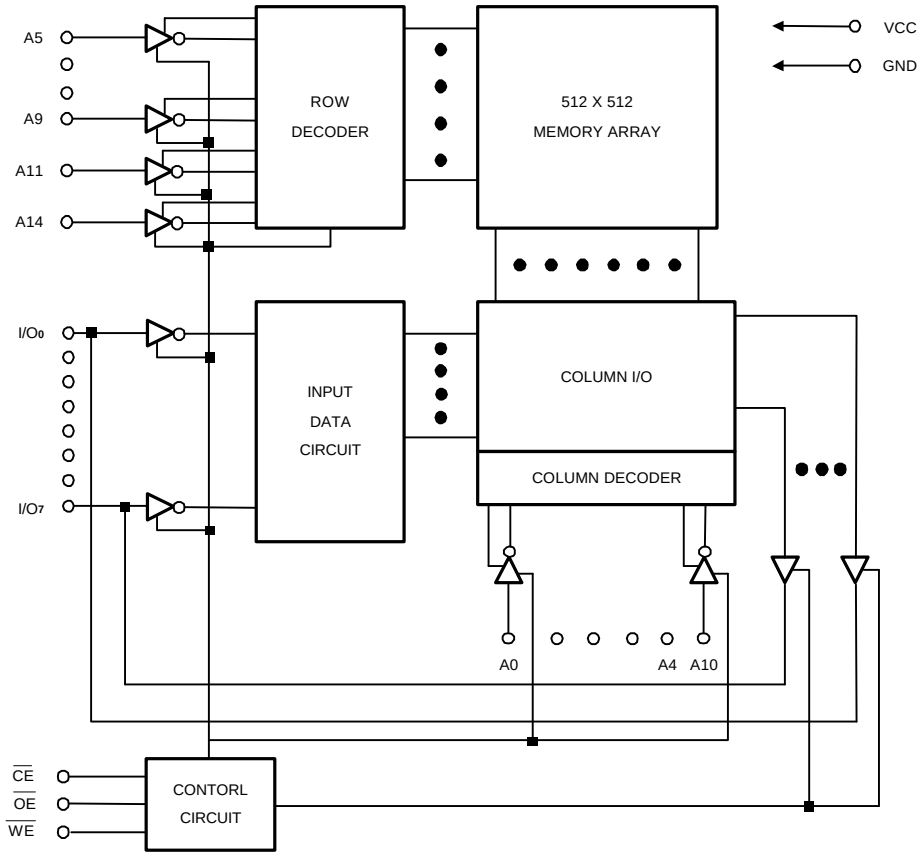
■ **SOP**



■ **TSOP**



Block Diagram



Pin Descriptions - SOP

Pin No.	Symbol	Description
1-10, 21, 23-26	A0 - A14	Address Input
11-13, 15-19	I/O_0 - I/O_7	Data Inputs/Outputs
14	GND	Ground
20	$\overline{CE}$	Chip Enable
22	$\overline{OE}$	Output Enable
27	$\overline{WE}$	Write Enable
28	VCC	Power Supply

Pin Description-TSOP

Pin No.	Symbol	Description
1	$\overline{OE}$	Output Enable
2-5, 8-17, 28	A0 - A14	Address Input
7	VCC	Power Supply
6	$\overline{WE}$	Write Enable
18-20, 22-26	I/O_0 - I/O_7	Data Inputs/Outputs
21	GND	Ground
27	$\overline{CE}$	Chip Enable

Recommended DC Operating Conditions

(T_A = 0°C to + 70°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
VCC	Supply Voltage	4.5	5.0	5.5	V
GND	Ground	0	0	0	V
V_{IH}	Input High Voltage	2.2	3.5	VCC + 0.3	V
V_{IL}	Input Low Voltage	-0.3	0	+0.8	V

Absolute Maximum Ratings*

VCC to GND . . . . . -0.5V to +7.0V
IN, IN/OUT Volt to GND . . . . . -0.5V to VCC + 0.5V
Operating Temperature, Topr . . . . . 0°C to +70°C
Storage Temperature, Tstg . . . . . -55°C to +125°C
Power Dissipation, P_T 0.7W
Soldering Temp. & Time . . . . . 260°C, 10 sec

*Comments

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

DC Electrical Characteristics (T_A = 0°C to + 70°C, VCC = 5.0V ± 10%, GND = 0V)

Symbol	Parameter	A625308-70L		A625308-70S		Unit	Conditions
		Min.	Max.	Min.	Max.		
$\lvert I_{LI} \rvert$	Input Leakage Current	-	1	-	1	µA	V_{IN} = GND to VCC
$\lvert I_{LO} \rvert$	Output Leakage Current	-	1	-	1	µA	$\overline{CE}$ = V_{IH} or $\overline{OE}$ = V_{IH} or $\overline{WE}$ = V_{IH} $V_{I/O}$ = GND to VCC
I_{CC}	Active Power Supply Current	-	15	-	15	mA	$\overline{CE}$ = V_{IL}, $I_{I/O}$ = 0mA
I_{CC1}	Dynamic Operating Current	-	70	-	70	mA	Min. Cycle, Duty = 100% $\overline{CE}$ = V_{IL}, $I_{I/O}$ = 0mA
I_{CC2}	Dynamic Operating Current	-	15	-	15	mA	$\overline{CE}$ = V_{IL}, V_{IH} = VCC V_{IL} = 0V, f = 1 MHz $I_{I/O}$ = 0 mA

DC Electrical Characteristics (continued)

Symbol	Parameter	A625308-70L		A625308-70S		Unit	Conditions
		Min.	Max.	Min.	Max.		
I_{SB}	Supply Current Standby Power	-	3	-	2	mA	$\overline{CE}$ = V_{IH}
I_{SB1}		-	100	-	25	μA	$\overline{CE}$ ≥ VCC - 0.2V V_{IN} ≥ 0V
V_{OL}	Output Low Voltage	-	0.4	-	0.4	V	I_{OL} = 2.1mA
V_{OH}	Output High Voltage	2.4	-	2.4	-	V	I_{OH} = -1.0mA

Truth Table

Mode	$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	I/O Operation	Supply Current
Standby	H	X	X	High Z	I_{SB}, I_{SB1}
Output Disable	L	H	H	High Z	I_{CC}, I_{CC1}, I_{CC2}
Read	L	L	H	D_{OUT}	I_{CC}, I_{CC1}, I_{CC2}
Write	L	X	L	D_{IN}	I_{CC}, I_{CC1}, I_{CC2}

Note: X: H or L

Capacitance (T_A = 25°C, f = 1.0 MHz)

Symbol	Parameter	Min.	Max.	Unit	Conditions
C_{IN}*	Input Capacitance		6	pF	V_{IN} = 0V
$C_{I/O}$*	Input/Output Capacitance		8	pF	$V_{I/O}$ = 0V

* These parameters are sampled and not 100% tested.

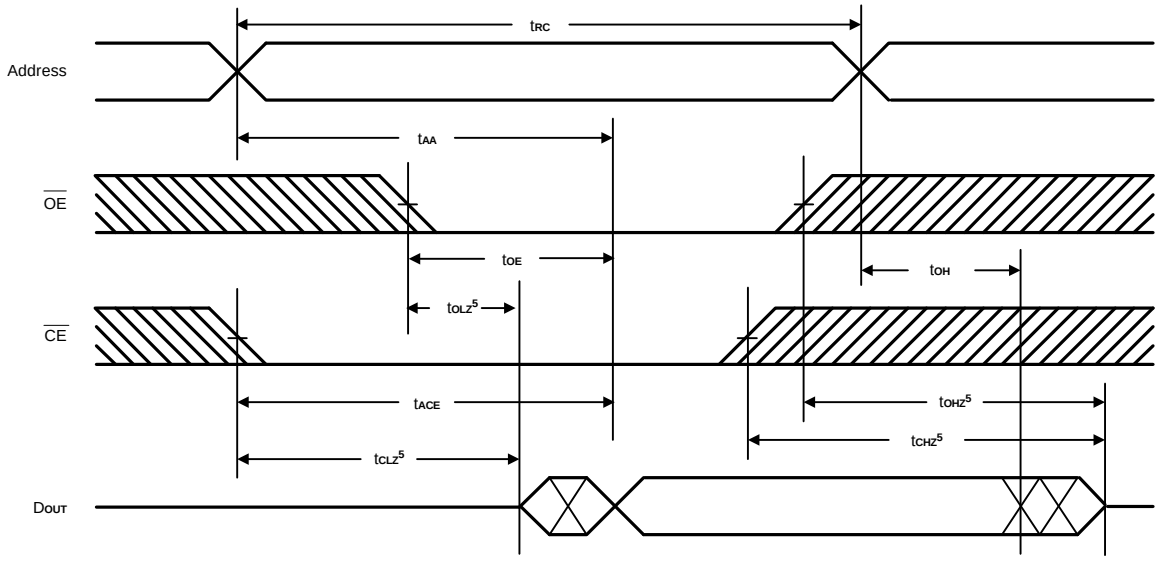
AC Characteristics (T_A = 0°C to +70°C, VCC = 5.0V ± 10%)

Symbol	Parameter	A625308-70L/70S		Unit
		Min.	Max.	
Read Cycle				
t_{RC}	Read Cycle Time	70	-	ns
t_{AA}	Address Access Time	-	70	ns
t_{ACE}	Chip Enable Access Time	-	70	ns
t_{OE}	Output Enable to Output Valid	-	35	ns
t_{CLZ}	Chip Enable to Output in Low Z	10	-	ns
t_{OLZ}	Output Enable to Output in Low Z	5	-	ns
t_{CHZ}	Chip Disable to Output in High Z	-	25	ns
t_{OHZ}	Output Disable to Output in High Z	-	25	ns
t_{OH}	Output Hold from Address Change	5	-	ns
Write Cycle				
t_{WC}	Write Cycle Time	70	-	ns
t_{CW}	Chip Enable to End of Write	60	-	ns
t_{AS}	Address Set up Time	0	-	ns
t_{AW}	Address Valid to End of Write	60	-	ns
t_{WP}	Write Pulse Width	50	-	ns
t_{WR}	Write Recovery Time	0	-	ns
t_{WHZ}	Write to Output in High Z	-	30	ns
t_{DW}	Data to Write Time Overlap	30	-	ns
t_{DH}	Data Hold from Write Time	0	-	ns
t_{OW}	Output Active from End of Write	5	-	ns

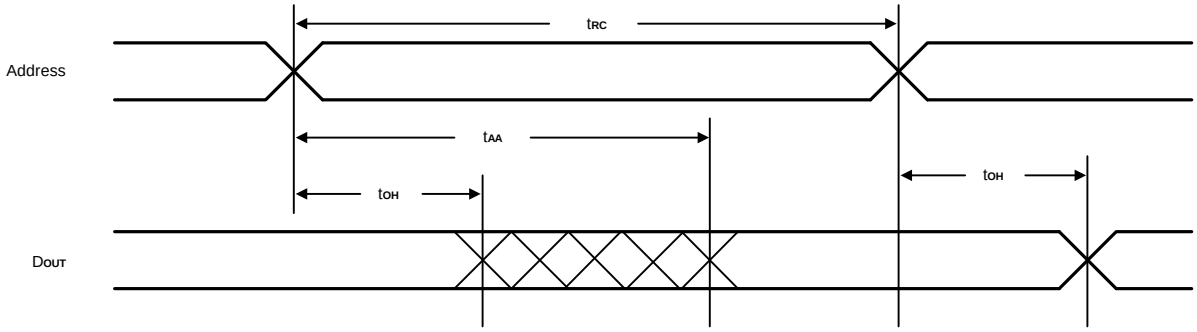
Notes: t_{CHZ}, t_{OHZ} and t_{WHZ} are defined as the time at which the outputs achieve the open circuit condition and are not referred to output voltage levels.

Timing Waveforms

Read Cycle 1 (1)

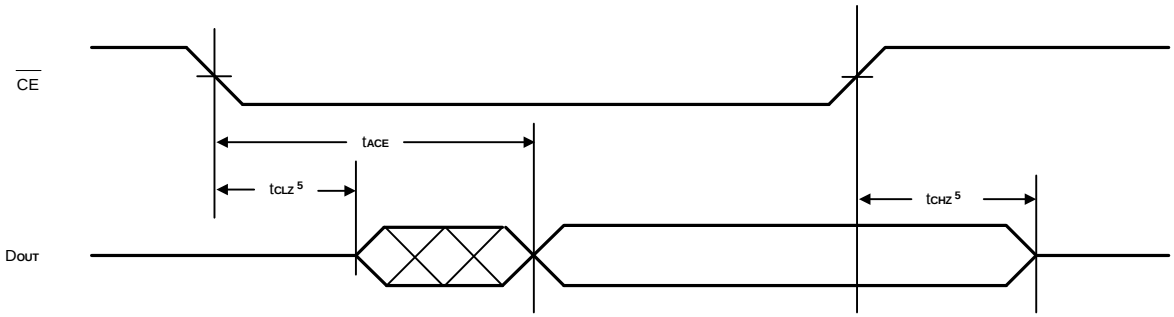


Read Cycle 2 (1, 2, 4)



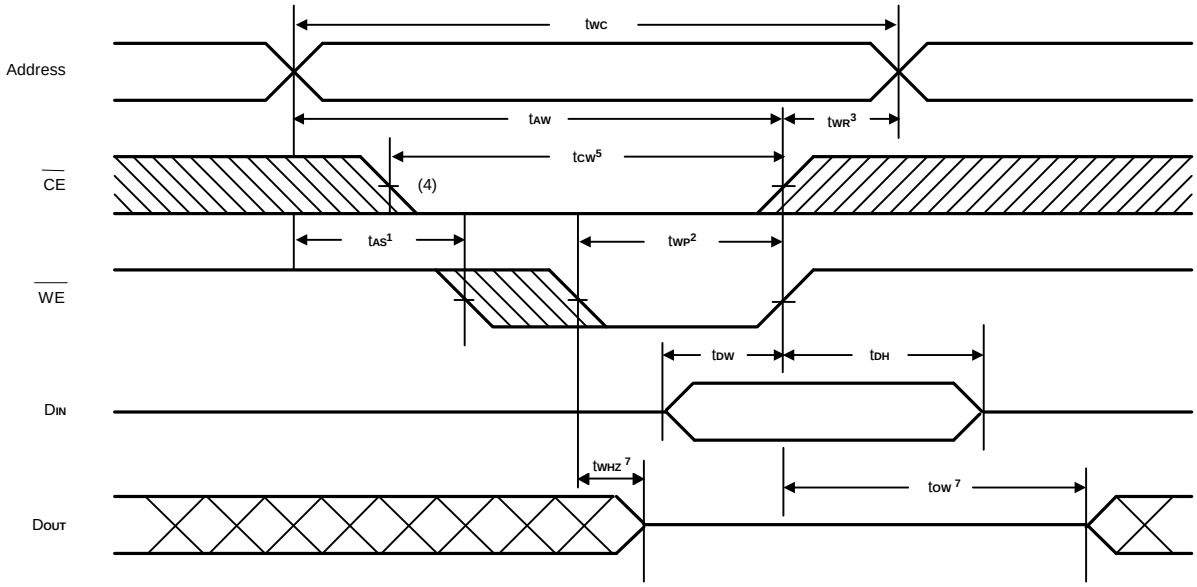
Timing Waveforms (continued)

Read Cycle 3 (1, 3, 4)



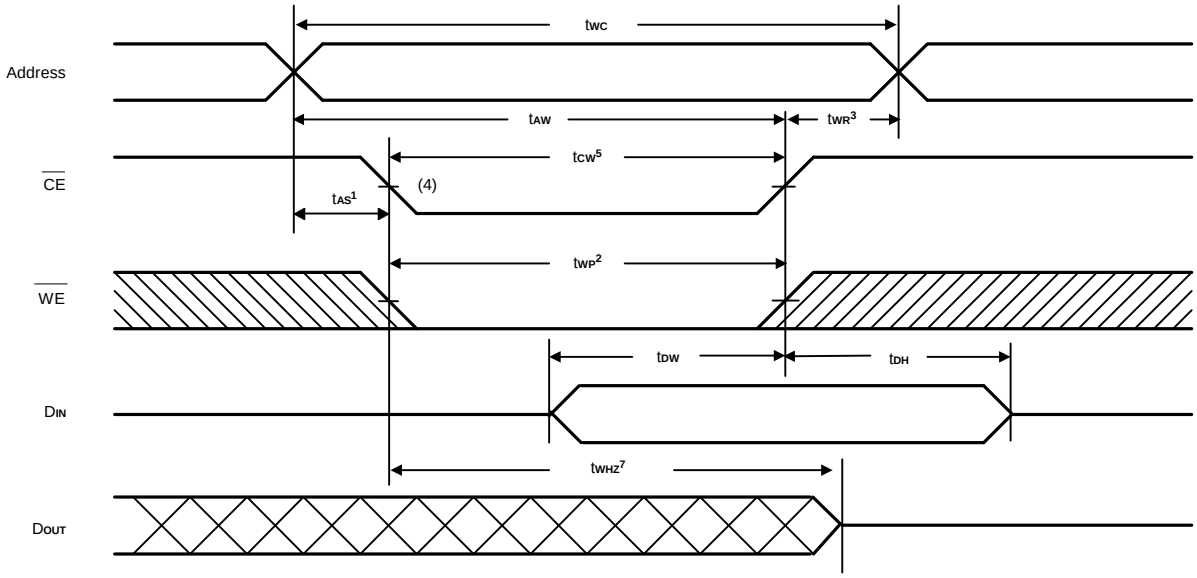
Notes: 1. $\overline{WE}$ is high for Read Cycle.
2. Device is continuously enabled, $\overline{CE}$ = V_{IL}.
3. Address valid prior to or coincident with $\overline{CE}$ transition low.
4. $\overline{OE}$ = V_{IL}.
5. Transition is measured ±500mV from steady state. This parameter is sampled and not 100% tested.

Write Cycle 1 (6)
(Write Enable Controlled)



Timing Waveforms (continued)

Write Cycle 2 [6]
(Chip Enable Controlled)



Notes: 1. t_{AS} is measured from the address valid to the beginning of Write.
2. A Write occurs during the overlap (t_{WP}) of a low $\overline{CE}$ and a low $\overline{WE}$.
3. t_{WR} is measured from the earliest of $\overline{CE}$ or $\overline{WE}$ going high to the end of the Write cycle.
4. If the $\overline{CE}$ low transition occurs simultaneously with the $\overline{WE}$ low transition or after the $\overline{WE}$ transition, outputs remain in a high impedance state.
5. t_{CW} is measured from the later of $\overline{CE}$ going low to the end of Write.
6. $\overline{OE}$ level is high or low.
7. Transition is measured ±500mV from steady. This parameter is sampled and not 100% tested.

AC Test Conditions

Input Pulse Levels	0V, 3.0V
Input Rise And Fall Time	5 ns
Input and Output Timing Reference Levels	1.5V
Output Load	See Figure 1,2

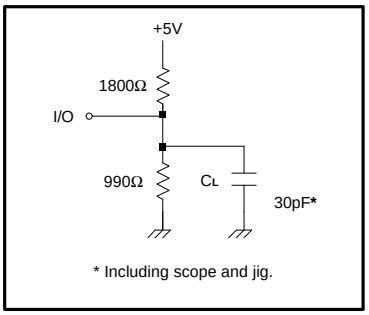


Figure 1. Output Load

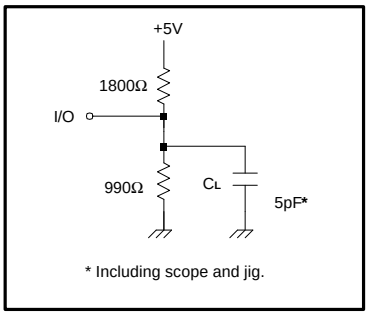


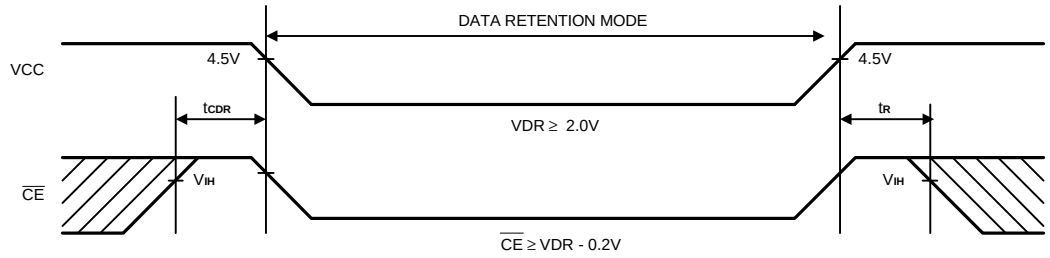
Figure 2. Output Load for t_{CLZ} t_{OLZ} , t_{CHZ}, t_{OHZ}, t_{WHZ}, and t_{OW}

Data Retention Characteristics (T_A = 0°C to 70°C)

Symbol	Parameter		Min.	Max.	Unit	Conditions
V_{DR}	VCC for Data Retention		2.0	5.5	V	$\overline{CE}$ ≥ VCC - 0.2V
I_{CCDR}	Data Retention Current	L Version	-	50*	µA	VCC = 3.0V, $\overline{CE}$ ≥ VCC - 0.2V V_{IN} ≥ 0V
		S Version		10**		
t_{CDR}	Chip Disable to Data Retention Time		0	-	ns	See Retention Waveform
t_R	Operation Recovery Time		5	-	ms	

***** A625308-70L I_{CCDR} : Max. 20µA at T_A = 0°C to +40°C
****** A625308-70S I_{CCDR} : Max. 3µA at T_A = 0°C to +40°C

Low VCC Data Retention Waveform



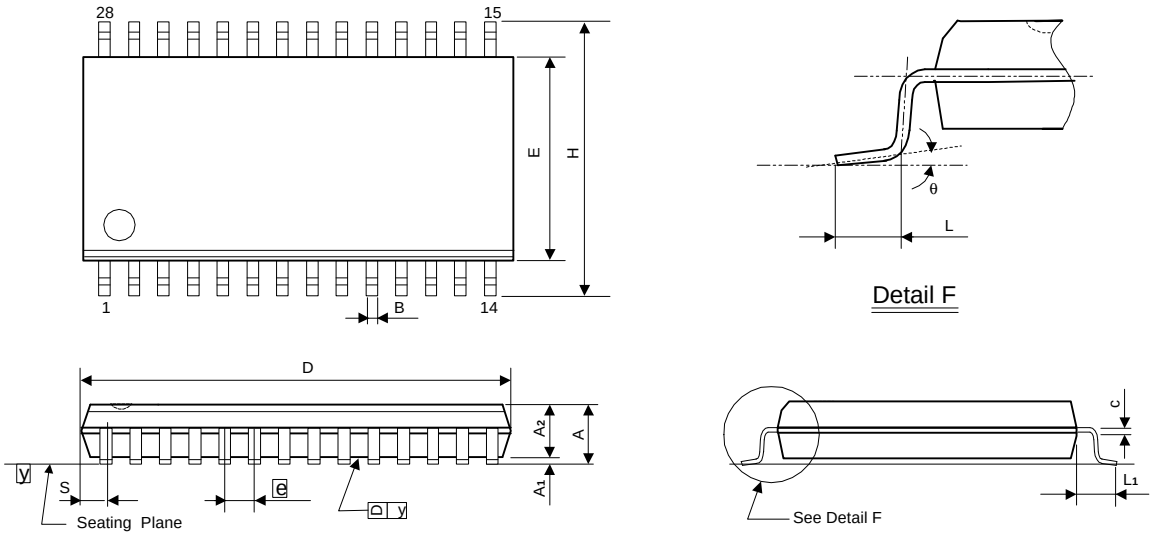
Ordering Information

Part No.	Access Time (ns)	Operating Current Max. (mA)	Standby Current Max. (μA)	Package
A625308M-70L	70	70	100	28L SOP
A625308M-70S		70	25	28L SOP
A625308V-70L		70	100	28L TSOP (Forward)
A625308V-70S		70	25	28L TSOP (Forward)
A625308R-70L		70	100	28L TSOP (Reverse)
A625308R-70S		70	25	28L TSOP (Reverse)

Package Information

SOP (W.B.) 28L Outline Dimensions

unit: inches/mm



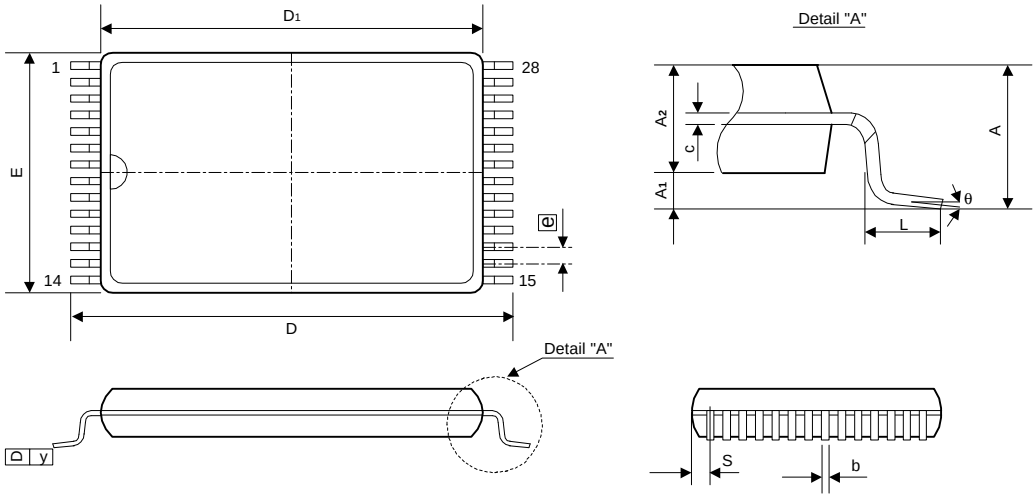
Symbol	Dimensions in inches			Dimensions in mm		
	Min	Nom	Max	Min	Nom	Max
A	-	-	0.112	-	-	2.85
A_1	0.004	-	-	0.10	-	-
A_2	0.093	0.098	0.103	2.36	2.49	2.62
B	0.014	0.016	0.020	0.36	0.41	0.51
C	0.008	0.010	0.012	0.20	0.25	0.30
D	-	0.713	0.728	-	18.11	18.49
E	0.326	0.331	0.336	8.28	8.41	8.53
e	0.044	0.050	0.056	1.12	1.27	1.42
H	0.453	0.465	0.477	11.51	11.81	12.12
L	0.028	0.036	0.044	0.71	0.91	1.12
L_1	0.059	0.067	0.075	1.50	1.70	1.91
S	-	-	0.047	-	-	1.19
y	-	-	0.004	-	-	0.10
θ	0°	-	8°	0°	-	8°

Notes:
1. The maximum value of dimension D includes end flash.
2. Dimension E does not include resin fins.
3. Dimension S includes end flash.

Package Information

TSOP 28L TYPE I (8 X 13.4mm) Outline Dimensions

unit: inches/mm



Symbol	Dimensions in inches			Dimensions in mm		
	Min	Nom	Max	Min	Nom	Max
A	-	-	0.049	-	-	1.25
A_1	0.002	-	-	0.05	-	-
A_2	0.037	0.039	0.041	0.95	1.00	1.05
b	0.007	0.009	0.011	0.17	0.22	0.27
c	0.005	-	0.008	0.12	-	0.21
E	0.311	0.315	0.319	7.90	8.00	8.10
L	0.012	0.020	0.028	0.30	0.50	0.70
D	0.520	0.528	0.536	13.20	13.40	13.60
D_1	0.461	0.465	0.469	11.70	11.80	11.90
e	0.022 BSC			0.55 BSC		
S	0.017 TYP			0.425 TYP		
y	-	-	0.004	-	-	0.10
θ	0°	-	5°	0°	-	5°

Notes:
1. The maximum value of dimension D_1 includes end flash.
2. Dimension E does not include resin fins.
3. Dimension S includes end flash.