



W2464A

# 8K X 8 HIGH SPEED CMOS STATIC RAM

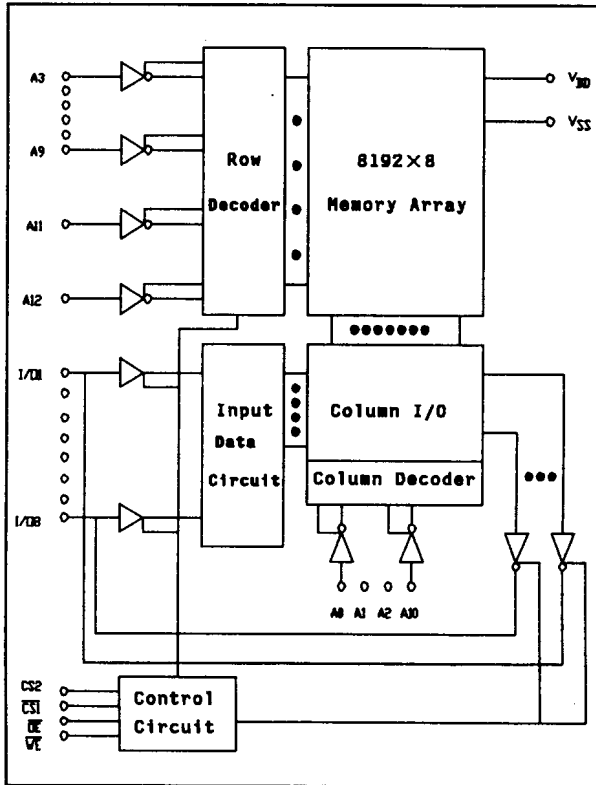
## FEATURES

- Low Power Consumption :
  - Active : 400mW (Typ.)
  - Standby : 25  $\mu$ W (Typ.)-- L-Version
- Fast Access Time : 20/25 ns (Max.)
- Single +5V Supply
- Fully Static Operation
- Direct TTL Compatible : All Inputs and Outputs
- Three State Outputs
- Capability of Battery Back Up Operation (L-Version)
- Data Retention Voltage : 2V (Min.) (L-Version)
- Available in 28 Pin SOJ, or Skinny DIP Packages

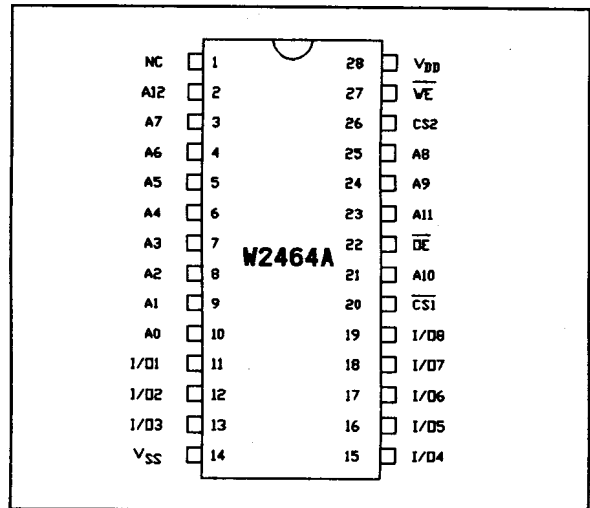
## DESCRIPTION

The W2464A is a Very High Speed, Low Power CMOS Static RAM Organized as 8192 x 8 Bits and Operates on a Single 5-Volt Supply. It is Manufactured Using WINBOND's High Performance CMOS Technology.

## BLOCK DIAGRAM



## PIN CONFIGURATION



## PIN DESCRIPTION

SYMBOL	DESCRIPTION
A0 - A12	Address Inputs
I/O1-I/O8	Data Inputs/Outputs
CS1, CS2	Chip Select 1,2 Inputs
WE	Write Enable Input
OE	Output Enable Input
VDD	Power Supply
VSS	Ground
NC	No Connection

**DC CHARACTERISTICS**
**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	RATING	UNIT
Supply Voltage to $V_{SS}$ Potential	-0.5 to +7.0	V
Inputs/Outputs to $V_{SS}$ Potential	-0.5 to $V_{DD}+0.5$	V
Allowable Power Dissipation	1.0	W
Storage Temperature	-55 to +150	°C
Operating Temperature	0 to +70	°C

**TRUTH TABLE**

$\overline{CS1}$	CS2	$\overline{OE}$	$\overline{WE}$	Mode	I/O1 - I/O8	$V_{DD}$ Current
H	X	X	X	Not Selected	High Z	$I_{SB}$ , $I_{SB1}$
X	L	X	X	Not Selected	High Z	$I_{SB}$ , $I_{SB1}$
L	H	H	H	Output Disable	High Z	$I_{DD}$
L	H	L	H	Read	Data Out	$I_{DD}$
L	H	X	L	Write	Data In	$I_{DD}$

**OPERATING CHARACTERISTICS**

( $V_{DD}=5V \pm 10\%$ ,  $V_{SS}=0V$ ,  $T_a=0$  to  $70^\circ C$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Low Voltage	$V_{IL}$	-	- 0.5	-	+ 0.8	V
Input High Voltage	$V_{IH}$	-	+ 2.2	-	$V_{DD} + 0.5$	V
Input Leakage Current	$I_{LI}$	$V_{IN} = V_{SS}$ to $V_{DD}$	-10	-	10	$\mu A$
Output Leakage Current	$I_{LO}$	$V_{I/O} = V_{SS}$ to $V_{DD}$ $\overline{CS1} = V_{IH}$ or $CS2 = V_{IL}$ or $\overline{OE} = V_{IH}$ or $\overline{WE} = V_{IL}$	-10	-	10	$\mu A$
Output Low Voltage	$V_{OL}$	$I_{OL} = +8.0mA$	-	-	0.4	V
Output High Voltage	$V_{OH}$	$I_{OH} = -4.0mA$	2.4	-	-	V
Operating Power Supply Current	$I_{DD}$	$\overline{CS1}=V_{IL}$ , $CS2=V_{IH}$ , $I/O=0mA$ CYCLE=MIN, DUTY=100%	-	-	150	mA
Standby Power Supply Current	$I_{SB}$	$\overline{CS1} = V_{IH}$ or $CS2 = V_{IL}$	-	-	30	mA
	$I_{SB1}$	$\overline{CS1} \geq V_{DD}-0.2V$ or $CS2 \leq 0.2V$	L	-	5	100
S			-	-	5000	$\mu A$

Note : Typical characteristics are at  $V_{DD}=5V, T_a=25^\circ C$ .

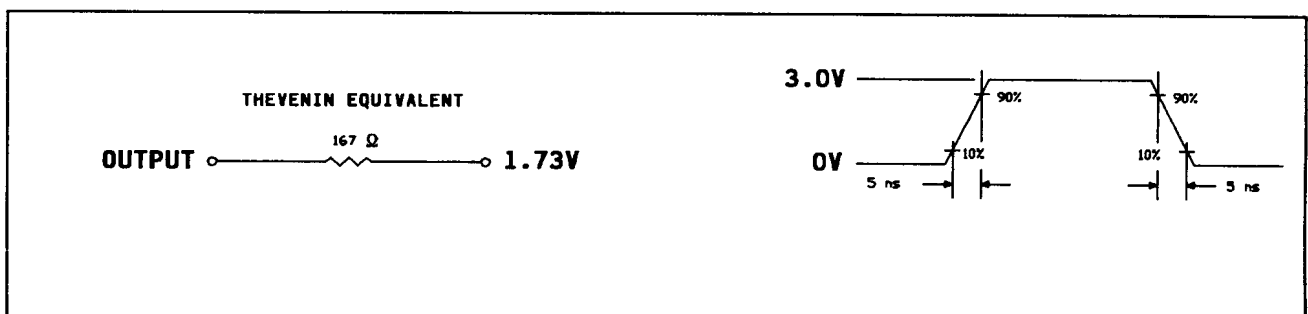
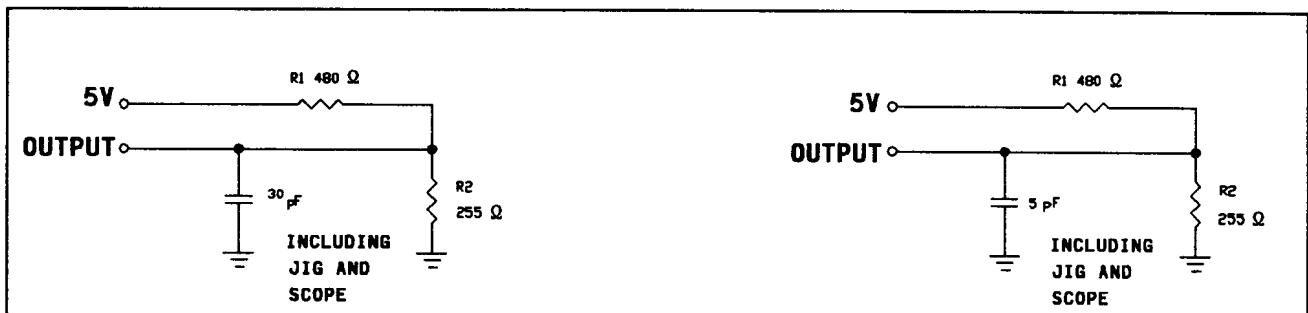
**CAPACITANCE**
 $(V_{DD}=5V, T_a=25^{\circ}C, f=1MHz)$ 

PARAMETER	SYMBOL	CONDITIONS	MAX.	UNIT
Input Capacitance	$C_{IN}$	$V_{IN}=0V$	5	pF
Input/Output Capacitance	$C_{I/O}$	$V_{OUT}=0V$	7	pF

Note : This parameter is sampled but not 100% tested.

**AC TEST CONDITIONS**

PARAMETER	CONDITIONS
Input Pulse Levels	0V to 3V
Input Rise and Fall Times	5ns
Input and Output Timing Reference Level	1.5V
Output Load	$C_L=30pF, I_{OH}/I_{OL}=-4mA/8mA$

**AC TEST LOADS AND WAVEFORMS**


**AC CHARACTERISTICS**
 $(V_{DD}=5V \pm 10\%, V_{SS}=0V, T_a=0 \text{ to } 70^\circ\text{C})$ 
**(1) READ CYCLE**

PARAMETER	SYMBOL	W2464A-20		W2464A-25		UNIT
		MIN.	MAX.	MIN.	MAX.	
Read Cycle Time	$T_{RC}$	20	-	25	-	ns
Address Access Time	$T_{AA}$	-	20	-	25	ns
Chip Select Access Time	$\overline{CS1}$ $T_{ACS1}$	-	20	-	25	ns
	$CS2$ $T_{ACS2}$	-	20	-	25	ns
Output Enable to Output Valid	$T_{AOE}$	-	8	-	10	ns
Chip Selection to Output in Low Z	$\overline{CS1}$ $T_{CLZ1}^*$	3	-	3	-	ns
	$CS2$ $T_{CLZ2}^*$	3	-	3	-	ns
Output Enable to Output in Low Z	$T_{OLZ}^*$	0	-	0	-	ns
Chip Deselection to Output in High Z	$\overline{CS1}$ $T_{CHZ1}^*$	-	10	-	12	ns
	$CS2$ $T_{CHZ2}^*$	-	10	-	12	ns
Output Disable to Output in High Z	$T_{OHZ}^*$	-	10	-	12	ns
Output Hold from Address Change	$T_{OH}$	3	-	3	-	ns

Note: \* This parameter is sampled but not 100% tested.

**(2) WRITE CYCLE**

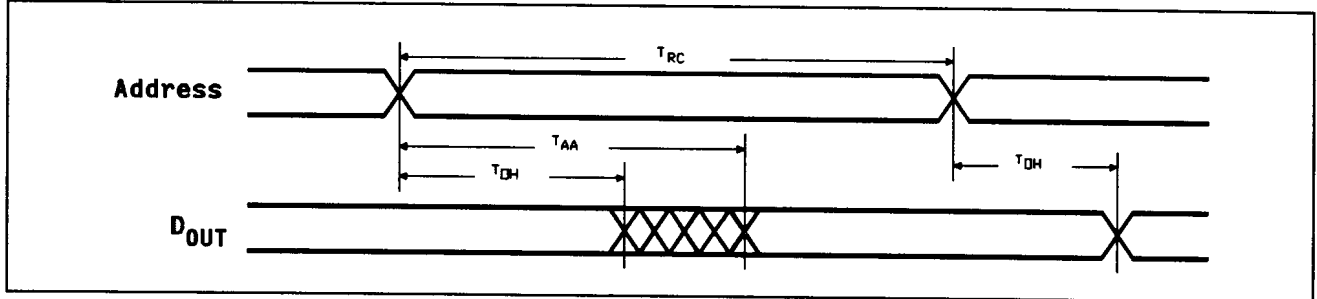
PARAMETER	SYMBOL	W2464A-20		W2464A-25		UNIT
		MIN.	MAX.	MIN.	MAX.	
Write Cycle Time	$T_{WC}$	20	-	25	-	ns
Chip Selection to End of Write	$T_{CW}$	17	-	22	-	ns
Address Valid to End of Write	$T_{AW}$	15	-	20	-	ns
Address Setup Time	$T_{AS}$	0	-	0	-	ns
Write Pulse Width	$T_{WP}$	12	-	15	-	ns
Write Recovery Time	$\overline{CS1}, \overline{WE}$ $T_{WR1}$	0	-	0	-	ns
	$CS2$ $T_{WR2}$	0	-	0	-	ns
Data Valid to End of Write	$T_{DW}$	10	-	12	-	ns
Data Hold from End of Write	$T_{DH}$	0	-	0	-	ns
Write to Output in High Z	$T_{WHZ}^*$	-	0	-	12	ns
Output Disable to Output in High Z	$T_{OHZ}^*$	-	0	-	12	ns
Output Active from End of Write	$T_{OW}$	0	-	0	-	ns

Note: \* This parameter is sampled but not 100% tested.

**TIMING WAVEFORMS**

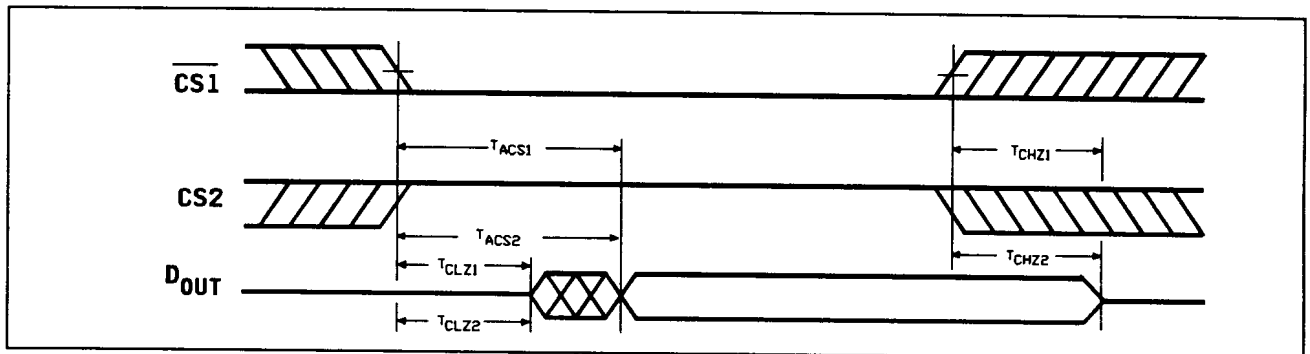
**READ CYCLE 1**

(Address Controlled)



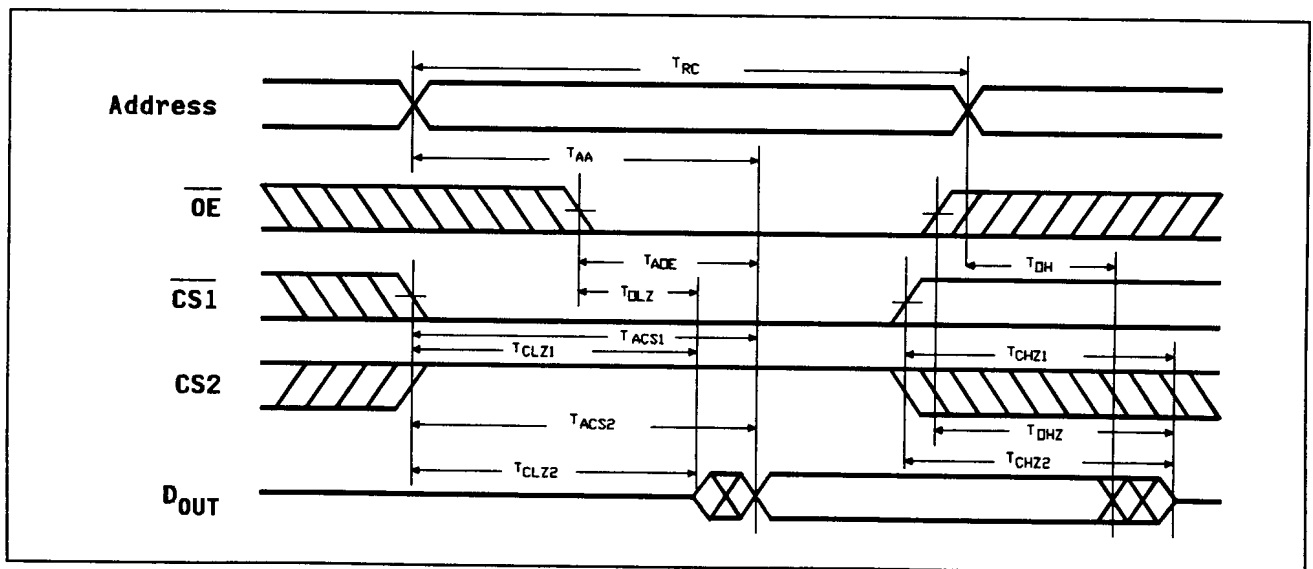
**READ CYCLE 2**

(Chip Select Controlled)

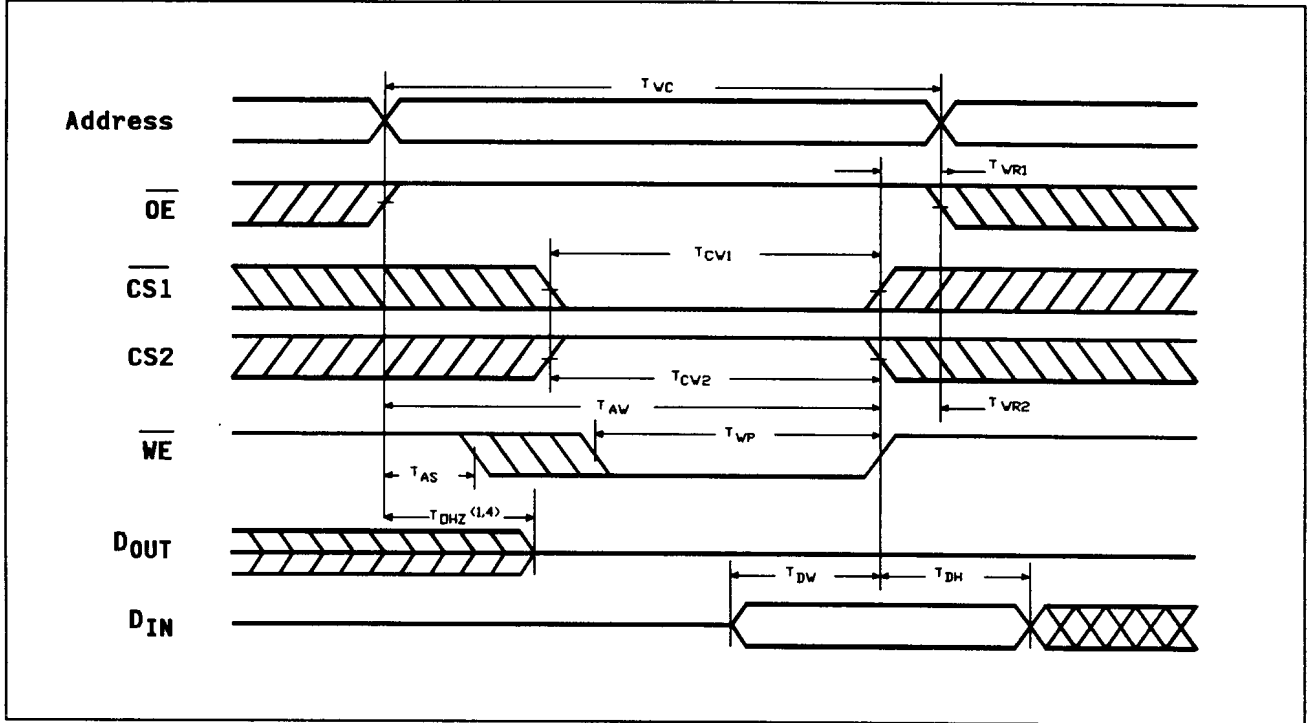


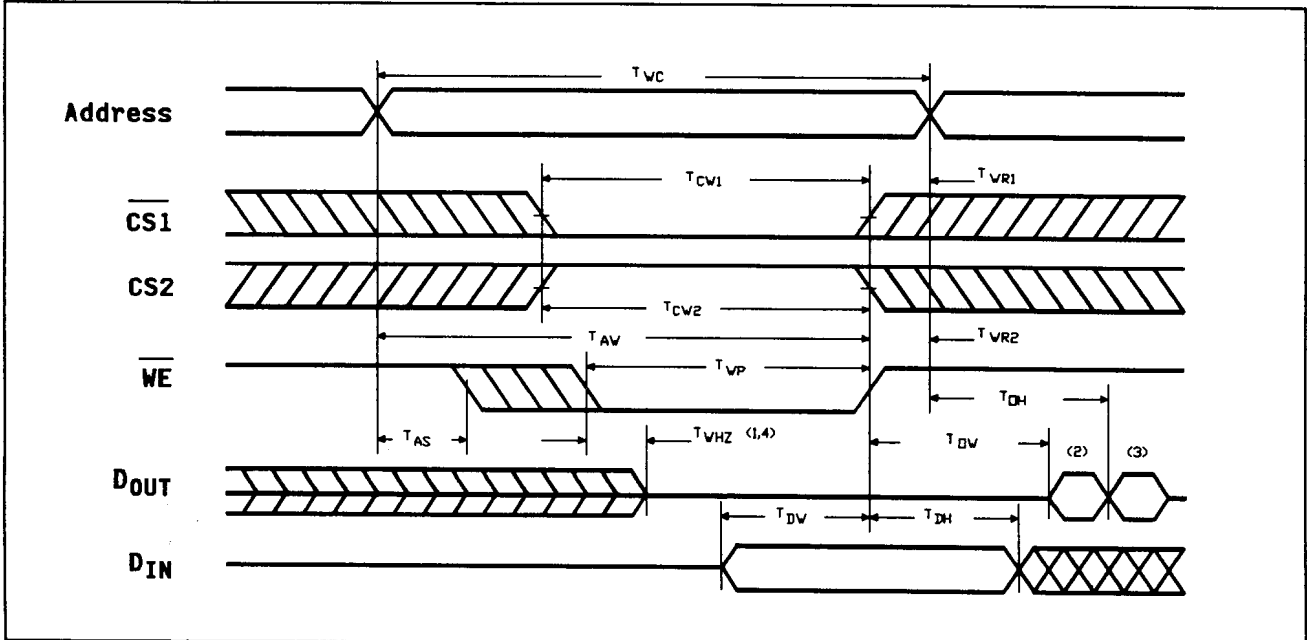
**READ CYCLE 3**

(Output Enable Controlled)



**WRITE CYCLE 1**

 ( $\overline{OE}$  Clock)

**WRITE CYCLE 2**

 ( $\overline{OE} = V_{IL}$  Fixed)


**Notes:**

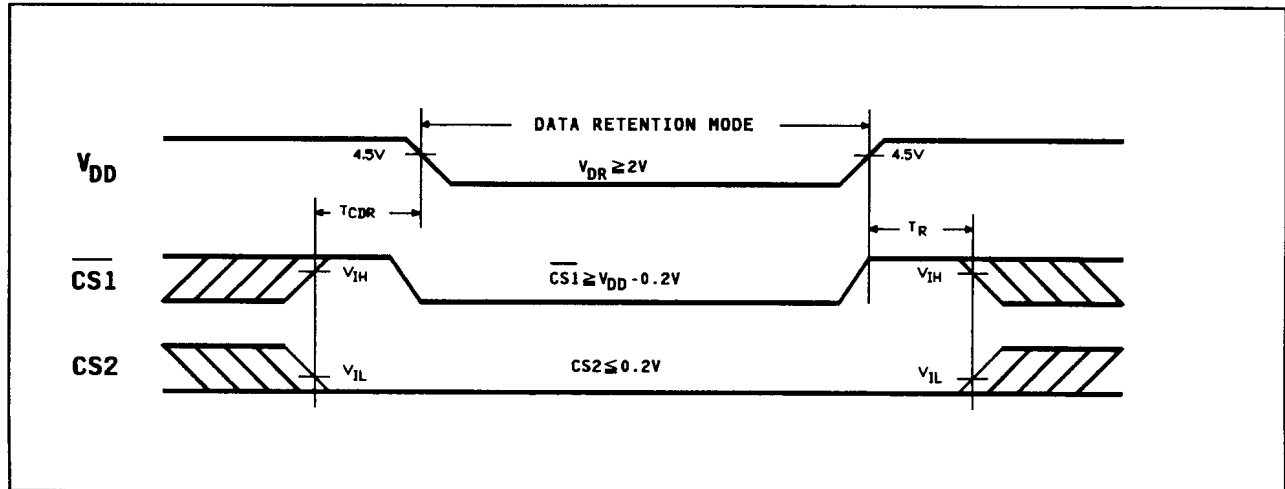
1. During this period, I/O pins are in the output state so that the input signals of opposite phase to the outputs must not be applied.
2.  $D_{OUT}$  is the same phase of write data of this write cycle.
3.  $D_{OUT}$  is the read data of next address.
4. Transition is measured  $\pm 500\text{mV}$  from steady state with  $C_L=5\text{pF}$ . This parameter is guaranteed but not 100% tested.

**DATA RETENTION CHARACTERISTICS**

 ( $T_a=0$  to  $70^\circ\text{C}$ , Guaranteed Only for L-Version)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{DD}$ for Data Retention	$V_{DR}$	$\overline{CS1} \geq V_{DD} - 0.2\text{V}$ , or $CS2 \leq 0.2\text{V}$	2.0	-	-	V
Data Retention Current	$I_{DDDR}$	$\overline{CS1} \geq V_{DD} - 0.2\text{V}$ , or $CS2 \leq 0.2\text{V}$ $V_{DD}=3\text{V}$	-	2	100	$\mu\text{A}$
Chip Deselect to Data Retention Time	$T_{CDR}$	See Retention Waveform	0	-	-	ns
Operation Recovery Time	$T_R$		$T_{RC}^*$	-	-	ns

 Note: \*  $T_{RC}$  = Read Cycle Time

**DATA RETENTION WAVEFORM**


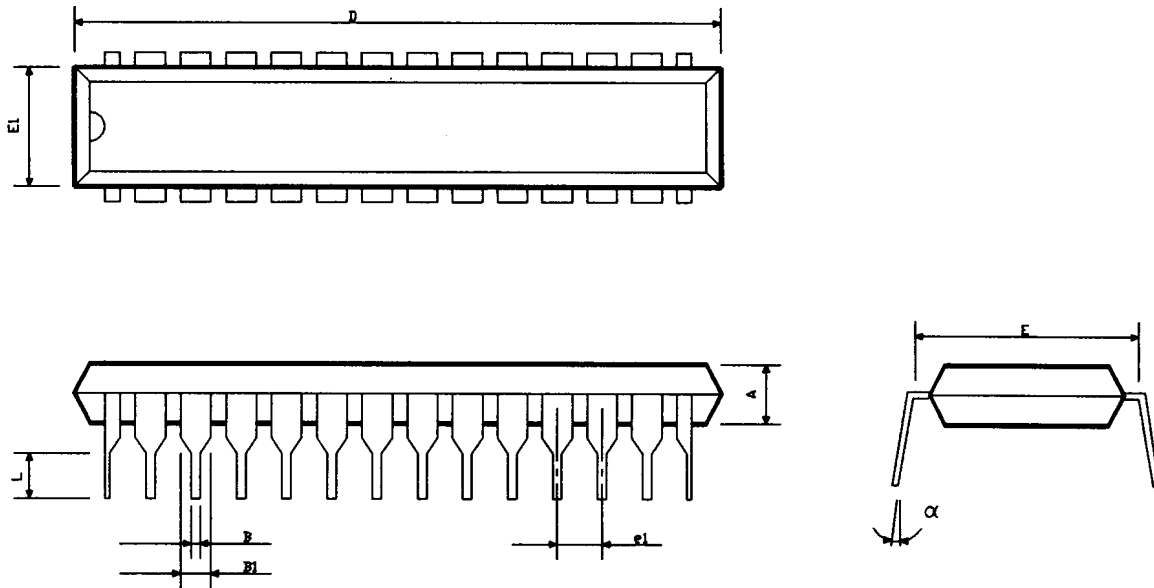
**ORDERING INFORMATION**

Part No.	Access Time (ns)	Operating Current Max. (mA)	Standby Current Max. (mA)	Package	Remark
W2464AK-20	20	150	5	300mil Skinny	
W2464AK-20L	20	150	0.1	300mil Skinny	Low Power
W2464AK-25	25	150	4	300mil Skinny	
W2464AK-25L	25	150	0.1	300mil Skinny	Low Power
W2464AJ-20	20	150	5	300mil SOJ	
W2464AJ-20L	20	150	0.1	300mil SOJ	Low Power
W2464AJ-25	25	150	4	300mil SOJ	
W2464AJ-25L	25	150	0.1	300mil SOJ	Low Power

**Notes:**

1. Winbond Electronics Corp. reserves the right to make changes to its products without prior notice, in order to improve design and performance.
2. If such products are to be used in applications in which personal injury might occur from failure, purchaser must do its own quality assurance testing appropriate to such application.



**28 LEAD P-DIP SKINNY**


Symbol	Dimensions in inch	Dimensions in mm
A	$0.130 \pm 0.010$	$3.302 \pm 0.254$
B	$0.018 \pm 0.004$	$0.457 \pm 0.102$
B1	$0.060 \pm 0.004$	$1.524 \pm 0.102$
D	$1.390 \pm 0.010$	$35.306 \pm 0.254$
E	$0.310 \pm 0.010$	$7.874 \pm 0.254$
E1	$0.290 \pm 0.010$	$7.366 \pm 0.254$
e1	$0.100 \pm 0.010$	$2.540 \pm 0.254$
L	$0.135 \pm 0.010$	$3.429 \pm 0.254$
$\alpha$	$0^\circ \sim 15^\circ$	$0^\circ \sim 15^\circ$



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