



## 2114A 1024 X 4 BIT STATIC RAM

	2114AL-1	2114AL-2	2114AL-3	2114AL-4	2114A-4	2114A-5
Max. Access Time (ns)	100	120	150	200	200	250
Max. Current (mA)	40	40	40	40	70	70

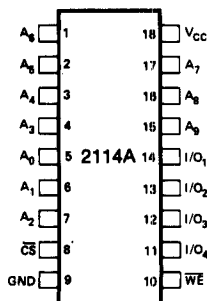
- **HMOS Technology**
- **Low Power, High Speed**
- **Identical Cycle and Access Times**
- **Single +5V Supply  $\pm 10\%$**
- **High Density 18 Pin Package**
- **Completely Static Memory - No Clock or Timing Strobe Required**
- **Directly TTL Compatible: All Inputs and Outputs**
- **Common Data Input and Output Using Three-State Outputs**
- **2114 Upgrade**

The Intel® 2114A is a 4096-bit static Random Access Memory organized as 1024 words by 4-bits using HMOS, a high performance MOS technology. It uses fully DC stable (static) circuitry throughout, in both the array and the decoding, therefore it requires no clocks or refreshing to operate. Data access is particularly simple since address setup times are not required. The data is read out nondestructively and has the same polarity as the input data. Common input/output pins are provided.

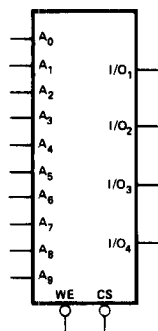
The 2114A is designed for memory applications where the high performance and high reliability of HMOS, low cost, large bit storage, and simple interfacing are important design objectives. The 2114A is placed in an 18-pin package for the highest possible density.

It is directly TTL compatible in all respects: inputs, outputs, and a single +5V supply. A separate Chip Select ( $\overline{CS}$ ) lead allows easy selection of an individual package when outputs are or-tied.

### PIN CONFIGURATION



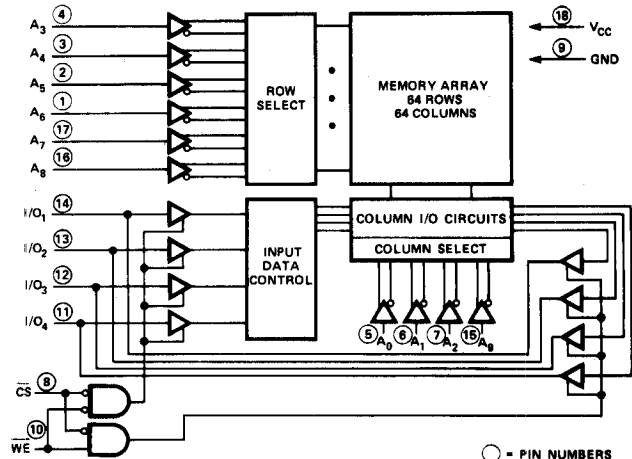
### LOGIC SYMBOL



### PIN NAMES

$A_0 - A_9$	ADDRESS INPUTS	$V_{CC}$	POWER (+5V)
$\overline{WE}$	WRITE ENABLE	GND	GROUND
$\overline{CS}$	CHIP SELECT		
$I/O_1 - I/O_4$	DATA INPUT/OUTPUT		

### BLOCK DIAGRAM



## 2114A FAMILY

### ABSOLUTE MAXIMUM RATINGS\*

Temperature Under Bias .....	-10°C to 80°C
Storage Temperature .....	-65°C to 150°C
Voltage on any Pin	
With Respect to Ground .....	-3.5V to +7V
Power Dissipation .....	1.0W
D.C. Output Current .....	5mA

\*COMMENT: Stresses above 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 above those indicated in the operational sections of this specification is not implied. Exposure is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### D.C. AND OPERATING CHARACTERISTICS

T<sub>A</sub> = 0°C to 70°C, V<sub>CC</sub> = 5V ± 10%, unless otherwise noted.

SYMBOL	PARAMETER	2114AL-1/L-2/L-3/L-4		2114A-4/-5			UNIT	CONDITIONS
		Min.	Typ. <sup>[1]</sup> Max.	Min.	Typ. <sup>[1]</sup> Max.			
I <sub>LI</sub>	Input Load Current (All Input Pins)		10			10	μA	V <sub>IN</sub> = 0 to 5.5V
I <sub>LO</sub>	I/O Leakage Current		10			10	μA	$\overline{CS} = V_{IH}$ V <sub>I/O</sub> = GND to V <sub>CC</sub>
I <sub>CC</sub>	Power Supply Current		25 40		50 70		mA	V <sub>CC</sub> = max, I <sub>I/O</sub> = 0 mA, T <sub>A</sub> = 0°C
V <sub>IL</sub>	Input Low Voltage	-3.0	0.8	-3.0		0.8	V	
V <sub>IH</sub>	Input High Voltage	2.0	6.0	2.0		6.0	V	
I <sub>OL</sub>	Output Low Current	2.1	9.0	2.1	9.0		mA	V <sub>OL</sub> = 0.4V
I <sub>OH</sub>	Output High Current	-1.0	-2.5	-1.0	-2.5		mA	V <sub>OH</sub> = 2.4V
I <sub>OS</sub> [2]	Output Short Circuit Current		40			40	mA	

NOTE: 1. Typical values are for T<sub>A</sub> = 25°C and V<sub>CC</sub> = 5.0V.  
2. Duration not to exceed 30 seconds.

### CAPACITANCE

T<sub>A</sub> = 25°C, f = 1.0 MHz

SYMBOL	TEST	MAX	UNIT	CONDITIONS
C <sub>I/O</sub>	Input/Output Capacitance	5	pF	V <sub>I/O</sub> = 0V
C <sub>IN</sub>	Input Capacitance	5	pF	V <sub>IN</sub> = 0V

NOTE: This parameter is periodically sampled and not 100% tested.

### A.C. CONDITIONS OF TEST

Input Pulse Levels .....	0.8 Volt to 2.0 Volt
Input Rise and Fall Times .....	10 nsec
Input and Output Timing Levels .....	1.5 Volts
Output Load .....	1 TTL Gate and C <sub>L</sub> = 100 pF

## 2114A FAMILY

### A.C. CHARACTERISTICS $T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$ , $V_{CC} = 5V \pm 10\%$ , unless otherwise noted.

#### READ CYCLE <sup>[1]</sup>

SYMBOL	PARAMETER	2114AL-1		2114AL-2		2114AL-3		2114A-4/L-4		2114A-5		UNIT
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
$t_{RC}$	Read Cycle Time	100		120		150		200		250		ns
$t_A$	Access Time		100		120		150		200		250	ns
$t_{CO}$	Chip Selection to Output Valid		70		70		70		70		85	ns
$t_{CX}$	Chip Selection to Output Active	10		10		10		10		10		ns
$t_{OD}$	Output 3-state from Deselection		30		35		40		50		60	ns
$t_{OHA}$	Output Hold from Address Change	15		15		15		15		15		ns

#### WRITE CYCLE <sup>[2]</sup>

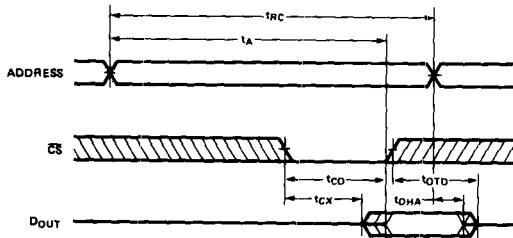
SYMBOL	PARAMETER	2114AL-1		2114AL-2		2114AL-3		2114A-4/L-4		2114A-5		UNIT
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
$t_{WC}$	Write Cycle Time	100		120		150		200		250		ns
$t_W$	Write Time	75		75		90		120		135		ns
$t_{WR}$	Write Release Time	0		0		0		0		0		ns
$t_{OTW}$	Output 3-state from Write		30		35		40		50		60	ns
$t_{DW}$	Data to Write Time Overlap	70		70		90		120		135		ns
$t_{DH}$	Data Hold from Write Time	0		0		0		0		0		ns

**NOTES:**

1. A Read occurs during the overlap of a low  $\overline{CS}$  and a high  $\overline{WE}$ .
2. A Write occurs during the overlap of a low  $\overline{CS}$  and a low  $\overline{WE}$ .  $t_W$  is measured from the latter of  $\overline{CS}$  or  $\overline{WE}$  going low to the earlier of  $\overline{CS}$  or  $\overline{WE}$  going high.

### WAVEFORMS

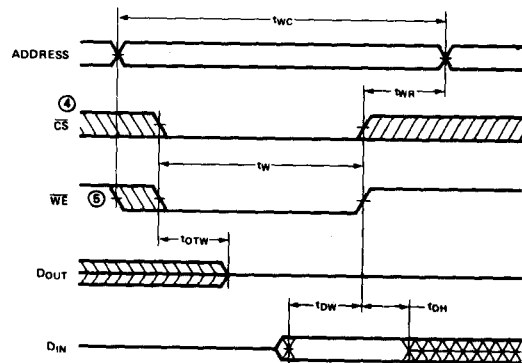
#### READ CYCLE <sup>③</sup>



**NOTES:**

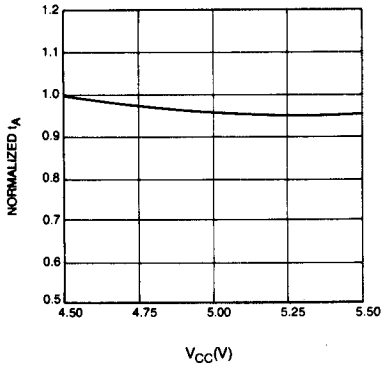
3.  $\overline{WE}$  is high for a Read Cycle.
4. If the  $\overline{CS}$  low transition occurs simultaneously with the  $\overline{WE}$  low transition, the output buffers remain in a high impedance state.
5.  $\overline{WE}$  must be high during all address transitions.

#### WRITE CYCLE

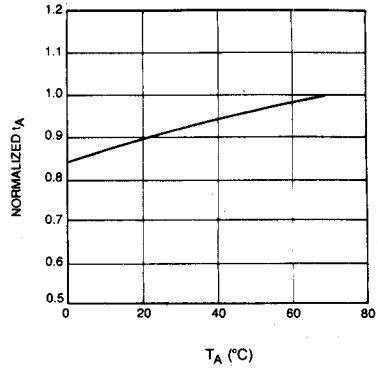


TYPICAL D.C. AND A.C. CHARACTERISTICS

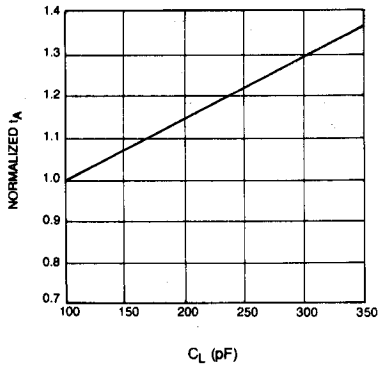
NORMALIZED ACCESS TIME VS. SUPPLY VOLTAGE



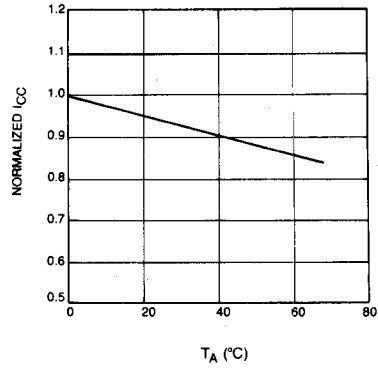
NORMALIZED ACCESS TIME VS. AMBIENT TEMPERATURE



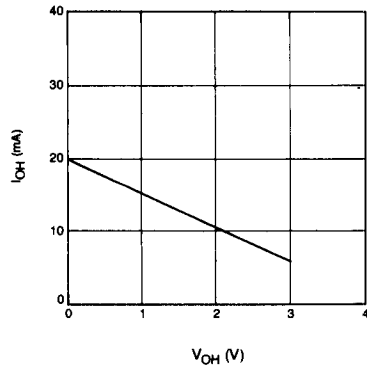
NORMALIZED ACCESS TIME VS. OUTPUT LOAD CAPACITANCE



NORMALIZED POWER SUPPLY CURRENT VS. AMBIENT TEMPERATURE



OUTPUT SOURCE CURRENT VS. OUTPUT VOLTAGE



OUTPUT SINK CURRENT VS. OUTPUT VOLTAGE

