DESCRIPTION

The 54/74S200/201 and 54/74S301 are Schottky clamped TTL, read/write memory arrays organized as 256 words of one bit each. They feature either open collector or tri-state outputs options for optimization of word expansion in bussed organizations. Memory expansion is further enhanced by full on-chip address decoding, three chip enable inputs and PNP input transistors which reduce input loading to 25μA for a "1" level and −250μA (S54S200/201/301) or −100μA (N74S200/201/301) for a "0" level.

The additional feature of output blanking during write ($\overline{D_O}$ terminal "H" or "Hi-Z" state) permits $\overline{D_O}$ and D_{IN} terminals to share a common I/O line to reduce system interconnections. Both devices have fast read access and write cycle times and thus are ideally suited in high speed memory applications such as "Cache", buffers, scratch pads, writable control stores, etc.

Both devices are available in the commercial and military temperature ranges. For the commercial temperature range (0°C to +75°C) specify N74S200/201/301, B or F. For the military temperature range (−55°C to +125°C) specify S54S200/201/301, F only.

FEATURES

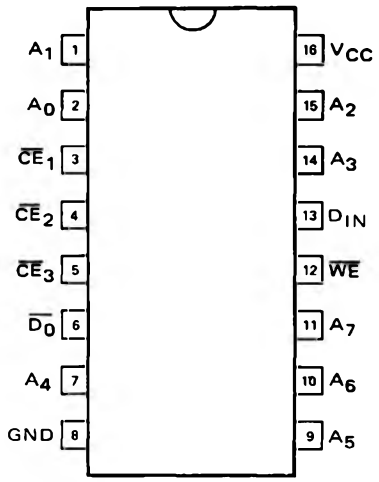
- **ORGANIZATION — 256 X 1**
- **ADDRESS ACCESS TIME:**
  - **S54S200/201/301 — 70ns MAXIMUM**
  - **N74S200/201/301 — 50 ns MAXIMUM**
- **WRITE CYCLE TIME:**
  - **S54S200/201/301 — 60ns MAXIMUM**
  - **N74S200/201/301 — 50ns MAXIMUM**
- **POWER DISSIPATION — 1.5mW/BIT TYPICAL**
- **INPUT LOADING:**
  - **S54S200/201/301 — (−250μA) MAXIMUM**
  - **N74S200/201/301 — (−100μA) MAXIMUM**
- **OUTPUT BLANKING DURING WRITE**
- **ON-CHIP ADDRESS DECODING**
- **OUTPUT OPTION:**
  - **TRI-STATE — 54/74S200/201**
  - **OPEN COLLECTOR — 54/74S301**
- **16 PIN CERAMIC DIP**

APPLICATIONS

BUFFER MEMORY
WRITABLE CONTROL STORE
MEMORY MAPPING
PUSH DOWN STACK
SCRATCH PAD

PIN CONFIGURATION

B, F PACKAGE*



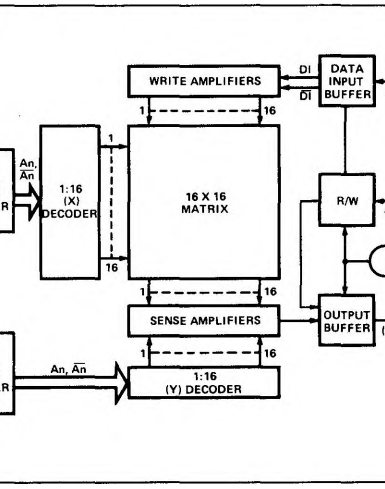
*B — Plastic
F — Cerdip

TRUTH TABLE

MODE	$\overline{CE}$*	$\overline{WE}$	D_{IN}	$\overline{D_{OUT}}$	
				54/74S301	54/74S200/201
READ	0	1	X	STORED $\overline{DATA}$	STORED $\overline{DATA}$
WRITE "0"	0	0	0	1	High-Z
WRITE "1"	0	0	1	1	High-Z
DISABLED	1	X	X	1	High-Z

*"0" = All $\overline{CE}$ inputs low; "1" = One or more $\overline{CE}$ inputs high.
X = Don't care.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

PARAMETER		RATING	UNIT
V_{CC}	Power Supply Voltage	+7	Vdc
V_{IN}	Input Voltage	+5.5	Vdc
V_{OUT}	High Level Output Voltage (54/74S301)	+5.5	Vdc
V_O	Off-State Output Voltage (54/74S200/201)	+5.5	Vdc
T_A	Operating Temperature Range S54S200/201/301 N74S200/201/301)	 −55° to +125° 0° to +70°	 °C °C
T_{stg}	Storage Temperature Range	−65° to +150°	°C

ELECTRICAL CHARACTERISTICS

S54S200/201/301 $-55°C \leq T_A \leq +125°C$, $4.5V \leq V_{CC} \leq 5.5V$
N74S200/201/301 $0°C \leq T_A \leq +70°C$, $4.75V \leq V_{CC} \leq 5.25V$

PARAMETER		TEST CONDITIONS	S54S200/201/301			N74S200/201/301			UNIT	NOTES
			MIN	TYP[2]	MAX	MIN	TYP[2]	MAX		
V_{IH}	High Level Input Voltage	V_{CC} = MAX	2.0			2.0			V	1
V_{IL}	Low Level Input Voltage	V_{CC} = MIN			0.8			0.85	V	1
V_{IC}	Input Clamp Voltage	V_{CC} = MIN, I_{IN} = −18mA		−0.8	−1.2		−0.8	−1.2	V	1, 8
V_{OH}	High Level Output Voltage (N74S200/201)	V_{CC} = MIN I_{OH} = −10.3mA				2.4			V	1, 6
V_{OH}	High Level Output Voltage (S54S200/201)	V_{CC} = MIN I_{OH} = −5.2mA	2.4						V	1, 6
V_{OL}	Low Level Output Voltage	V_{CC} = MIN I_{OL} = 16mA		0.35	0.50		0.35	0.45	V	1, 7
I_{OLK}	Output Leakage Current (54/74S301)	V_{CC} = MIN V_O = 2.4V		1	50		1	40	μA	5
		V_{IH} = 2V V_O = 5.5V		1	50		1	40	μA	5
$I_{O(OFF)}$	Hi-Z State Output Current (54/74S200/201)	V_{CC} = MAX V_O = 5.5V		1	50		1	40	μA	5
		V_{IH} = 2V V_O = 0.4V		−1	−50		−1	−40	μA	5
I_I	Input Current at V_{IN} MAX	V_{CC} = MAX, V_{IN} = 5.5V			1			1	mA	8
I_{IH}	High Level Input Current	V_{CC} = MAX, V_{IH} = 2.7V		1	25		1	25	μA	8
I_{IL}	Low Level Input Current	V_{CC} = MAX, V_{IL} = 0.45V		−10	−250		−10	−100	μA	8
I_{OS}	Short Circuit Output Current (54/74S200/201)	V_{CC} = MAX V_O = 0V	−30		−100	−30		−100	mA	3
I_{CC}	V_{CC} Supply Current (54/74S200/201/301)	V_{CC} = MAX		80	130		80	130	mA	4
	V_{CC} Supply Current (54S200/201/301)	V_{CC} = MAX, T_A = +125°C			99				mA	4
C_{IN}	Input Capacitance	V_{IN} = 2.0V, V_{CC} = 5.0V		5			5		pF	
C_{OUT}	Output Capacitance	V_{OUT} = 2.0V, V_{CC} = 5.0V		8			8		pF	

NOTES:
1. All voltage values are with respect to network ground terminal.
2. All typical values are at V_{CC} = 5V, T_A = +25°C.
3. Duration of the short-circuit should not exceed one second.
4. I_{CC} is measured with the write enable and memory enable inputs grounded, all other inputs at 4.5V, and the output open.
5. Measured with V_{IH} applied to $\overline{CE1}$, $\overline{CE2}$ and $\overline{CE3}$.
6. Measured with logic "0" stored, and V_{IL} applied to $\overline{CE1}$, $\overline{CE2}$ and $\overline{CE3}$.
7. Measured with a logic "1" stored. Output sink current is supplied through a resistor to V_{CC}.
8. Test each input one at the time.

SWITCHING CHARACTERISTICS

S54S301 $-55°C \leq T_A \leq +125°C$, $4.5V \leq V_{CC} \leq 5.5V$
N74S301 $0°C \leq T_A \leq +70°C$, $4.75V \leq V_{CC} \leq 5.25V$

PARAMETER		TEST CONDITIONS		S54S301			N74S301			UNIT	NOTES[1]
		S54S301	N74S301	MIN	TYP[1]	MAX	MIN	TYP[1]	MAX		
t_{PLH}	Access Time From Address				40	70		40	50	ns	B, D, E
t_{PHL}					40	70		40	50	ns	B, D, E
t_{PHL}	Enable Time From Chip Enable					45			35	ns	C, D, E
t_{PLH}	Disable Time From Chip Enable					30			20	ns	C, D, E
t_{PLH}	Disable Time From Write Enable					40			30	ns	C, D, E
t_{SR}	Sense-Recovery Time					50			40	ns	D
t_w	Width of Write Enable Pulse			50			40			ns	H
	Setup Time:										
	Address-to-Write Enable			0			0			ns	
t_{setup}	Data-to-Write Enable	$R_{L1} = 270\Omega$ $R_{L2} = 1K\Omega$ $C_L = 15pF$	$R_{L1} = 270\Omega$ $R_{L2} = 1K\Omega$ $C_L = 15pF$	50			40			ns	
	Chip Enable-to-Write Enable			0			0			ns	D
	Hold Time:										
	Address-From-Write Enable			10			10			ns	
t_{hold}	Data-From-Write Enable			10			10			ns	
	Chip Enable-From-Write Enable			0			0			ns	

SWITCHING CHARACTERISTICS

S54S200/201 $-55°C \leq T_A \leq +125°C$, $4.5V \leq V_{CC} \leq 5.5V$
N74S200/201 $0°C \leq T_A \leq +70°C$, $4.75V \leq V_{CC} \leq 5.25V$

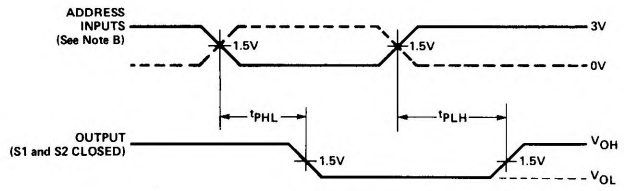
PARAMETER		TEST CONDITIONS		S54S200/201			N74S200/201			UNIT	NOTES[1]
		S54S200/201	N74S200/201	MIN	TYP[1]	MAX	MIN	TYP[1]	MAX		
t_{PLH}	Access Time From Address	$R_L = 270\Omega$ $C_L = 15pF$	$R_L = 270\Omega$ $C_L = 15pF$		40	70		40	50	ns	B, D, E
t_{PHL}					40	70		40	50	ns	B, D, E
t_{ZH}	Enable Time From Chip Enable					45			35	ns	C, D, F, G
t_{ZL}						45			35	ns	C, D, F, G
t_{HZ}	Disable Time From Chip Enable	$R_L = 270\Omega$ $C_L = 5pF$	$R_L = 270\Omega$ $C_L = 5pF$			30			20	ns	C, D, F, G
t_{LZ}						30			20	ns	C, D, F, G
t_{HZ}	Disable Time From Write Enable					40			30	ns	D, G
t_{LZ}						40			30	ns	D, G
t_{ZH}	Sense-Recovery Time					50			40	ns	D, F
t_{ZL}						50			40	ns	D, F
t_w	Width of Write Enable Pulse			50			40			ns	H
	Setup Time:										
	Address-to-Write Enable			0			0			ns	
t_{setup}	Data-to-Write Enable	$R_L = 270\Omega$ $C_L = 15pF$	$R_L = 270\Omega$ $C_L = 15pF$	50			40			ns	
	Chip Enable-to-Write Enable			0			0			ns	D
	Hold Time:										
	Address-From-Write Enable			10			10			ns	
t_{hold}	Data-From-Write Enable			10			10			ns	
	Chip Enable-From-Write Enable			0			0			ns	

NOTES: 1. All typical values are $V_{CC} = 5V$, $T_A = 25°C$. 2. See Notes on Switching Parameter Measurement Information.

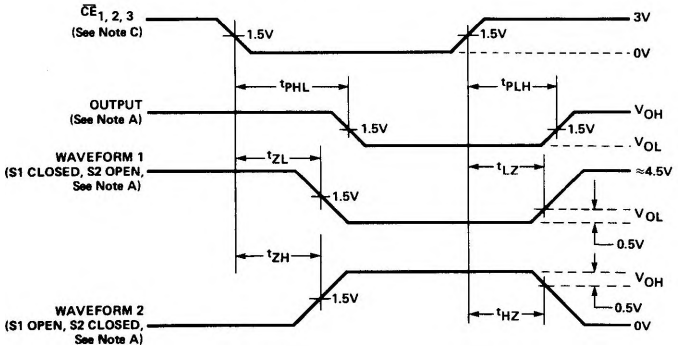
SWITCHING PARAMETER MEASUREMENT INFORMATION

READ CYCLE

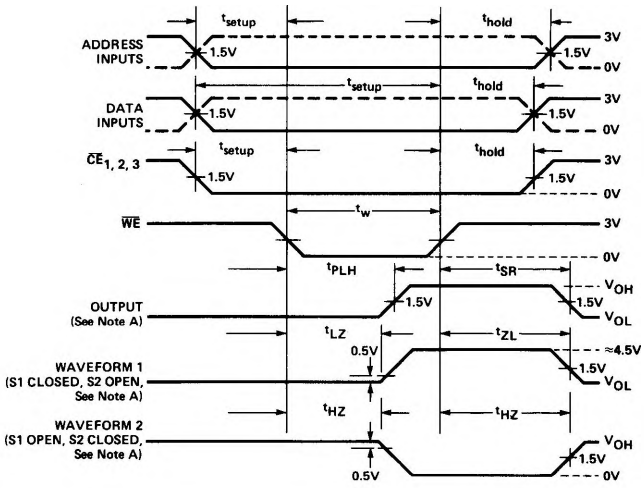
ACCESS TIME FROM ADDRESS



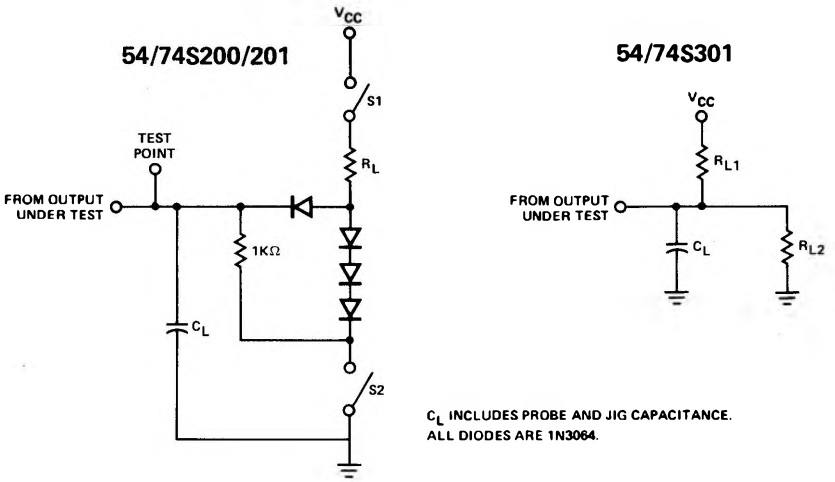
CHIP ENABLE AND DISABLE TIME



WRITE CYCLE



AC TEST LOAD



C_L INCLUDES PROBE AND JIG CAPACITANCE.
ALL DIODES ARE 1N3064.

NOTES:

A. Waveform 1 is for the output with internal conditions such that the output is low except when disabled. Waveform 2 is for the output with internal conditions such that the output is high except when disabled.
B. When measuring delay times from address inputs, the chip enable inputs are low and the write enable input is high.
C. When measuring delay times from chip enable inputs, the address inputs are steady-state and the write enable input is high.
D. Input waveforms are supplied by pulse generators having the following characteristics: $t_r \leq 2.5$ns, $t_f \leq 2.5$ns, PRR ≤ 1MHz, and $Z_{out} \approx 50\Omega$.
E. t_{PLH} propagation delay time, low-to-high-level output, t_{PHL} propagation delay time, high-to-low-level output.
F. t_{ZH} propagation delay time, hi-Z to high-level output, t_{ZL} propagation delay time, hi-Z to low-level output.
G. t_{HZ} propagation delay time, high-level to hi-Z output, t_{LZ} propagation delay time, low--level to hi-Z output.
H. Minimum required to guarantee a WRITE into the slowest bit.