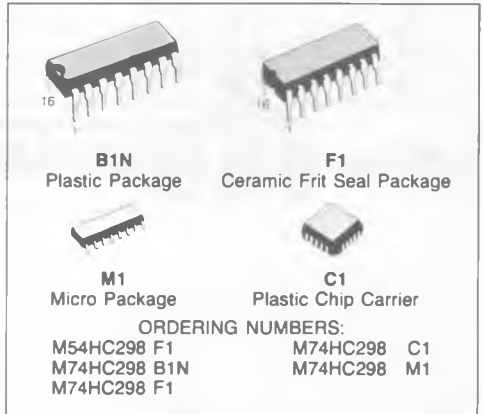




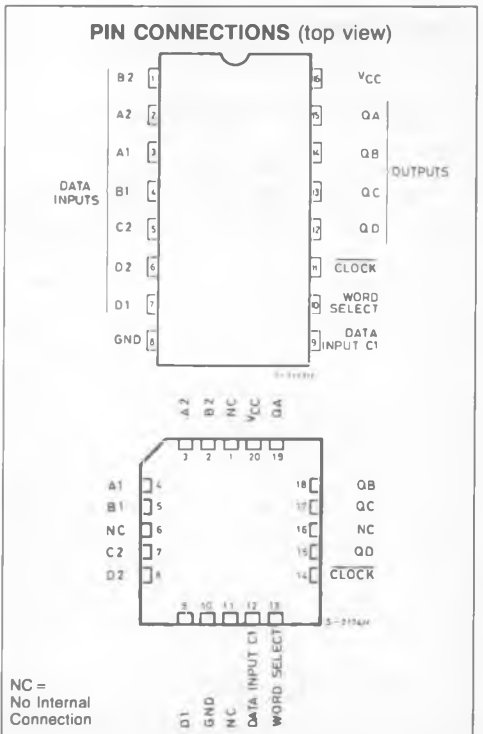
**QUAD 2-CHANNEL MULTIPLEXER/REGISTER**

- **LOW POWER DISSIPATION**  
 $I_{CC} = 4 \mu A$  (MAX.) at  $T_A = 25^\circ C$
- **HIGH NOISE IMMUNITY**  
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (MIN.)
- **OUTPUT DRIVE CAPABILITY**  
10 LSTTL LOADS
- **SYMMETRICAL OUTPUT IMPEDANCE**  
 $|I_{OH}| = |I_{OL}| = 4 \text{ mA}$  (MIN.)
- **BALANCED PROPAGATION DELAYS**  
 $t_{PLH} = t_{PHL}$
- **WIDE OPERATING VOLTAGE RANGE**  
 $V_{CC}$  (OPR) = 2V to 6V
- **PIN AND FUNCTION COMPATIBLE**  
WITH 54/74LS298






**DESCRIPTION**

The M54/74HC298 is a high speed CMOS QUAD 2-CHANNEL MULTIPLEXER/REGISTER fabricated in silicon gate C<sup>2</sup>MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption. These circuits are controlled by the signals WORD SELECT and CLOCK. When the WORD SELECT input is taken low Word 1 (A1, B1, C1 and D1) is presented to the input of the flip-flops, and when WORD SELECT is high Word 2 (A2, B2, C2 and D2) is presented to the inputs of the flip-flops. The select word is clocked to the output terminals on the negative edge of the clock pulse. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

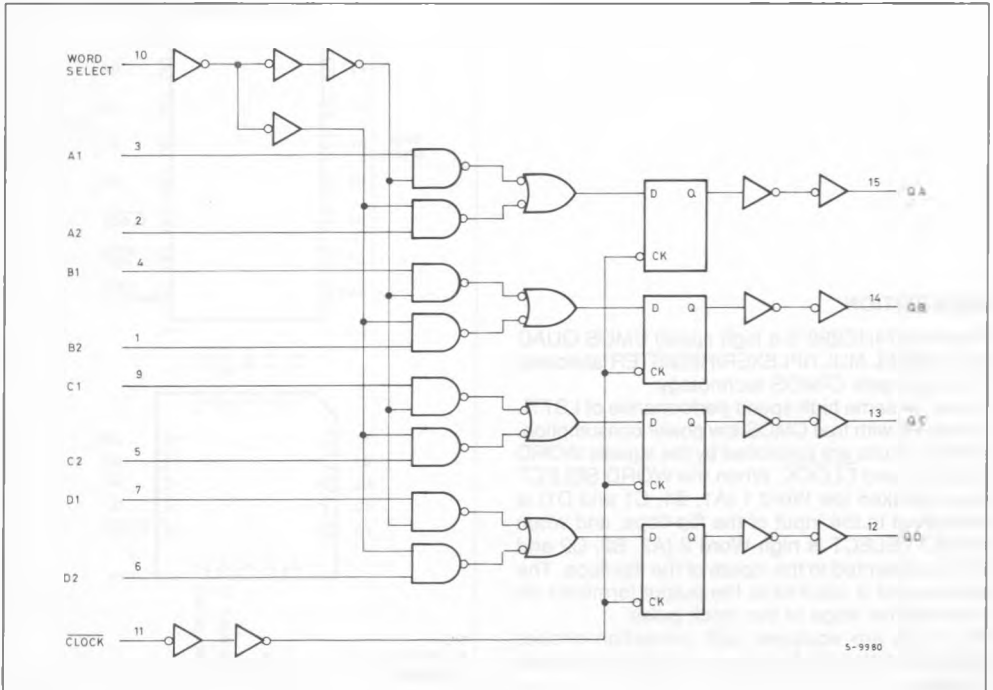


TRUTH TABLE

INPUTS		OUTPUTS			
WORD SELECT	CLOCK	QA	QB	QC	QD
L		a1	b1	c1	d1
H		a2	b2	c2	d2
X		QA0	QB0	QC0	QD0

X : DON'T CARE (INCLUDING TRANSITION)  
 a1, a2, ETC. : THE LEVEL OF STEADY-STATE INPUT AT a1, a2, ETC.  
 QA0, QB0, ETC. : THE LEVEL OF QA, QB, ETC. ENTERED ON THE MOST RECENT NEGATIVE TRANSITION OF THE CLOCK INPUT.

LOGIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	-0.5 to 7	V
$V_I$	DC Input Voltage	-0.5 to $V_{CC} + 0.5$	V
$V_O$	DC Output Voltage	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	DC Input Diode Current	$\pm 20$	mA
$I_{OK}$	DC Output Diode Current	$\pm 20$	mA
$I_O$	DC Output Source Sink Current Per Output Pin	$\pm 25$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or Ground Current	$\pm 50$	mA
$P_D$	Power Dissipation	500 (*)	mW
$T_{stg}$	Storage Temperature	-65 to 150	$^{\circ}C$

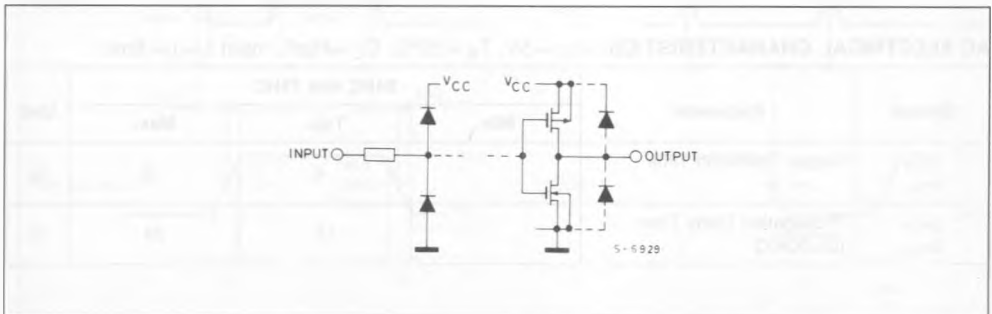
Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(\*) 500 mW:  $\cong 65^{\circ}C$  derate to 300 mW by 10 mW/ $^{\circ}C$ :  $65^{\circ}C$  to  $85^{\circ}C$

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	2 to 6	V
$V_I$	Input Voltage	0 to $V_{CC}$	V
$V_O$	Output Voltage	0 to $V_{CC}$	V
$T_A$	Operating Temperature 74HC Series 54HC Series	-40 to 85 -55 to 125	$^{\circ}C$
$t_r, t_f$	Input Rise and Fall Time	$V_{CC} \begin{cases} 2\text{ V} & 0 \text{ to } 1000 \\ 4.5\text{ V} & 0 \text{ to } 500 \\ 6\text{ V} & 0 \text{ to } 400 \end{cases}$	ns

## INPUT AND OUTPUT EQUIVALENT CIRCUIT



## DC SPECIFICATIONS

Symbol	Parameter	V <sub>CC</sub>	Test Condition	T <sub>A</sub> = 25°C 54HC and 74HC			- 40 to 85°C 74HC		- 55 to 125°C 54HC		Unit	
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.		
V <sub>IH</sub>	High Level Input Voltage	2.0		1.5	—	—	1.5	—	1.5	—	V	
		4.5		3.15	—	—	3.15	—	3.15	—		
		6.0		4.2	—	—	4.2	—	4.2	—		
V <sub>IL</sub>	Low Level Input Voltage	2.0		—	—	0.5	—	0.5	—	0.5	V	
		4.5		—	—	1.35	—	1.35	—	1.35		
		6.0		—	—	1.8	—	1.8	—	1.8		
V <sub>OH</sub>	High Level Output Voltage	2.0	V <sub>IH</sub>	I <sub>OH</sub>	1.9	2.0	—	1.9	—	1.9	—	V
		4.5	V <sub>IH</sub> or V <sub>IL</sub>	- 20 μA	4.4	4.5	—	4.4	—	4.4	—	
		6.0			5.9	6.0	—	5.9	—	5.9	—	
		4.5	- 4.0 mA	4.18	4.31	—	4.13	—	4.10	—		
6.0	- 5.2 mA	5.68		5.8	—	5.63	—	5.60	—			
V <sub>OL</sub>	Low Level Output Voltage	2.0	V <sub>IH</sub> or V <sub>IL</sub>	20 μA	—	0	0.1	—	0.1	—	0.1	V
		4.5			—	0	0.1	—	0.1	—	0.1	
		6.0			—	0	0.1	—	0.1	—	0.1	
		4.5			4.0 mA	—	0.17	0.26	—	0.33	—	
6.0	5.2 mA	—	0.18	0.26		—	0.33	—	0.40			
I <sub>IN</sub>	Input Leakage Current	6.0	V <sub>IN</sub> = V <sub>CC</sub> or GND	—	—	±0.1	—	±1	—	±1	μA	
I <sub>CC</sub>	Quiescent Supply Current	6.0	V <sub>IN</sub> = V <sub>CC</sub> or GND	—	—	4	—	40	—	80		

AC ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C, C<sub>L</sub> = 15pF, Input t<sub>r</sub> = t<sub>f</sub> = 6ns)

Symbol	Parameter	54HC and 74HC			Unit
		Min.	Typ.	Max.	
t <sub>TLH</sub> t <sub>THL</sub>	Output Transition Time		4	8	ns
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (CLOCK-Q)		15	24	ns

AC ELECTRICAL CHARACTERISTICS ( $C_L = 50\text{pF}$ , Input  $t_r = t_f = 6\text{ns}$ )

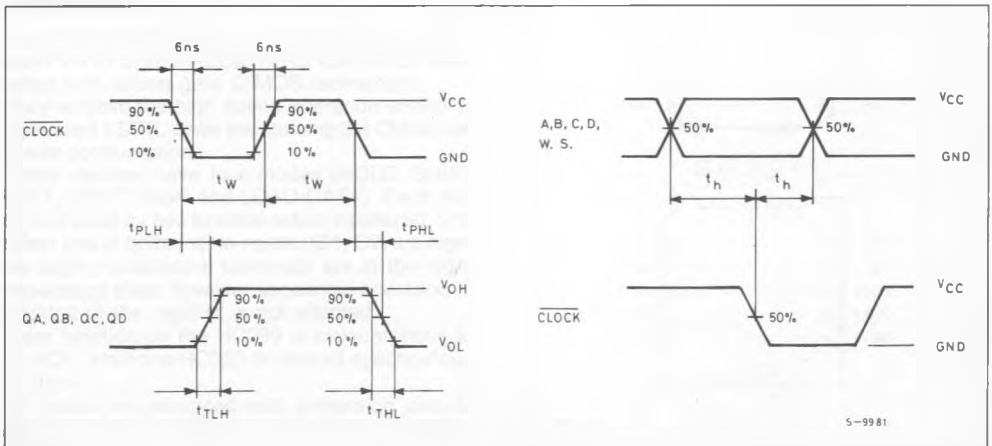
Symbol	Parameter	$V_{CC}$	Test Condition	$T_A = 25^\circ\text{C}$ 54HC and 74HC			$-40$ to $85^\circ\text{C}$ 74HC		$-55$ to $125^\circ\text{C}$ 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
$t_{TLH}$ $t_{THL}$	Output Transition Time	2.0 4.5 6.0		— — —	30 8 7	75 15 13	— — —	95 19 16	— — —	110 22 19	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay Time (CLOCK-Q)	2.0 4.5 6.0		— — —	72 18 15	140 28 24	— — —	175 35 30	— — —	210 42 36	ns
$t_{W(H)}$ $t_{W(L)}$	Minimum Pulse Width (CLOCK)	2.0 4.5 6.0		— — —	30 8 7	75 15 13	— — —	95 19 16	— — —	110 22 19	ns
$t_s$	Minimum Set-up Time (A,B,C,D)	2.0 4.5 6.0		— — —	10 2 2	50 10 9	— — —	65 13 11	— — —	75 15 13	ns
$t_s$	Minimum Set-up Time (W.S.)	2.0 4.5 6.0		— — —	30 8 7	75 15 13	— — —	95 19 16	— — —	110 22 19	ns
$t_h$	Minimum Hold Time (A,B,C,D, W.S.)	2.0 4.5 6.0		— — —	— — —	0 0 0	— — —	0 0 0	— — —	0 0 0	ns
$C_{IN}$	Input Capacitance			—	5	10	—	10	—	10	pF
$C_{PD} (*)$	Power Dissipation Capacitance			—	47	—	—	—	—	—	pF

Note (\*)  $C_{PD}$  is defined as the value of the internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test circuit).

Average operating current can be obtained from the equation:  $I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4$  (per bit)

And the  $C_{PD}$  for the operating n-bit can be obtained by the following equation:  $C_{PD} = 32 + n \cdot 15$

## SWITCHING CHARACTERISTICS TEST WAVEFORM



TEST CIRCUIT

