

# SN54HC298, SN74HC298 QUADRUPLE 2-INPUT MULTIPLEXER WITH STORAGE

D2804, MARCH 1984—REVISED JUNE 1989

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HCMOS Devices

- Selects One of Two 4-Bit Data Sources and Stores Data Synchronously with System Clock
- Dual Source for Operands and Constants in Arithmetic Processor; Can Release Processor Register Files for Acquiring New Data
- Implements Separate Registers Capable of Parallel Exchange of Contents, yet Retains External Load Capability
- Has Universal-Type Register for Implementing Various Shift Patterns
- Has Compound Left-Right Capability
- Package Options Include Ceramic Chip Carriers and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

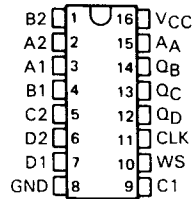
**description**

This quadruple two-input multiplexer with storage provides essentially the equivalent functional capabilities of two separate MSI functions ('HC157 and 'HC175) in a single 16-pin package.

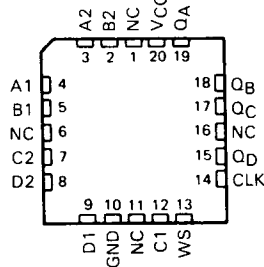
When the Word-Select (WS) input is low, word one (A1, B1, C1, D1) is applied to the flip-flops. A high Word-Select input causes word two (A2, B2, C2, D2) to be selected. The selected word is clocked to the output terminals on the negative-going edge of the clock pulse.

The SN54HC298 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74HC298 is characterized for operation from -40°C to 85°C.

**SN54HC298 . . . J PACKAGE  
SN74HC298 . . . N PACKAGE  
(TOP VIEW)**

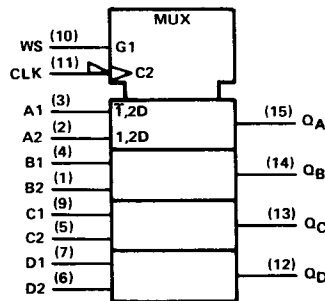


**SN54HC298 . . . FK PACKAGE  
(TOP VIEW)**



NC No internal connection

**logic symbol†**

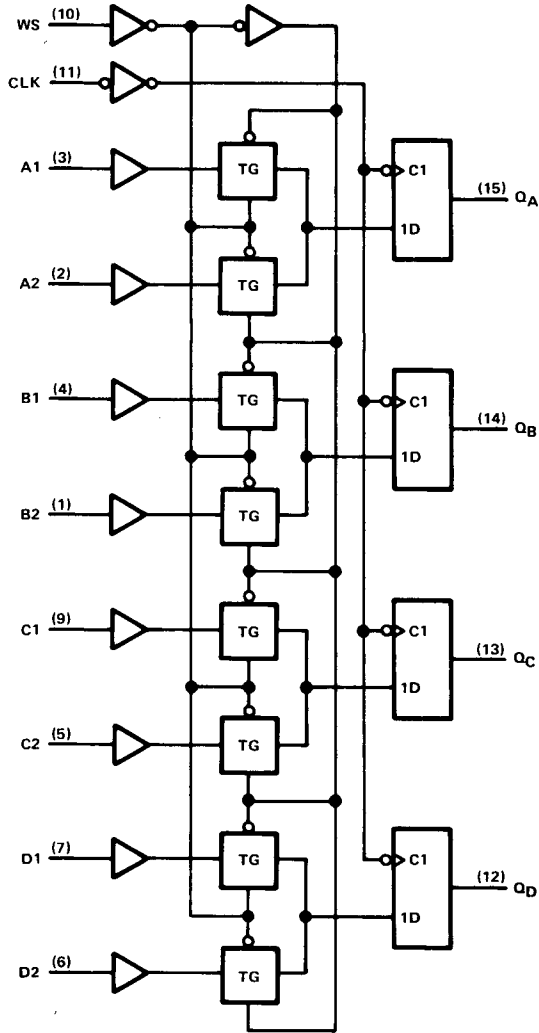


†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

Pin numbers shown are for J and N packages.

**SN54HC298, SN74HC298**  
**QUADRUPLE 2-INPUT MULTIPLEXER WITH STORAGE**

logic diagram (positive logic)



Pin numbers shown are for J and N packages.

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## absolute maximum ratings over operating free-air temperature range†

Supply voltage, $V_{CC}$ . . . . .	-0.5 V to 7 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) . . . . .	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) . . . . .	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) . . . . .	$\pm 25$ mA
Continuous current through $V_{CC}$ or GND pins . . . . .	$\pm 50$ mA
Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or J package . . . . .	300°C
Lead temperature 1,6 mm (1/16 in) from case for 10 s: N package . . . . .	260°C
Storage temperature range . . . . .	-65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## recommended operating conditions

		SN54HC298			SN74HC298			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage	2	5	6	2	5	6	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2$ V	1.5		1.5		V	
		$V_{CC} = 4.5$ V	3.15		3.15			
		$V_{CC} = 6$ V	4.2		4.2			
$V_{IL}$	Low-level input voltage	$V_{CC} = 2$ V	0	0.3	0	0.3	V	
		$V_{CC} = 4.5$ V	0	0.9	0	0.9		
		$V_{CC} = 6$ V	0	1.2	0	1.2		
$V_I$	Input voltage	0	$V_{CC}$		0	$V_{CC}$		V
$V_O$	Output voltage	0	$V_{CC}$		0	$V_{CC}$		V
$t_t$	Input transition (rise and fall) times	$V_{CC} = 2$ V	0	1000	0	1000	ns	
		$V_{CC} = 4.5$ V	0	500	0	500		
		$V_{CC} = 6$ V	0	400	0	400		
$T_A$	Operating free-air temperature	-55	125		-40	85		°C

## electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	$V_{CC}$	$T_A = 25^\circ\text{C}$		SN54HC298		SN74HC298		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	
$V_{OH}$	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -20 \mu\text{A}$	2 V	1.9	1.998	1.9	1.9	V		
		4.5 V	4.4	4.499	4.4	4.4			
		6 V	5.9	5.999	5.9	5.9			
	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -4$ mA	4.5 V	3.98	4.30	3.7	3.84			
$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 20 \mu\text{A}$	2 V	0.002	0.1	0.1	0.1	V		
		4.5 V	0.001	0.1	0.1	0.1			
		6 V	0.001	0.1	0.1	0.1			
	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 4$ mA	4.5 V	0.17	0.26	0.4	0.33			
$I_I$	$V_I = V_{CC}$ or 0	6 V	$\pm 0.1$	$\pm 100$	$\pm 1000$	$\pm 1000$	nA		
		6 V	8		160	80	$\mu\text{A}$		
$I_{CC}$	$V_I = V_{CC}$ or 0, $I_O = 0$	6 V	8		160	80	$\mu\text{A}$		
$C_i$		2 to 6 V	3	10	10	10	pF		

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timing requirements over recommended operating free-air temperature range (unless otherwise noted)

		V <sub>CC</sub>	T <sub>A</sub> = 25 °C		SN54HC298		SN74HC298		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
f <sub>clock</sub>	Clock frequency	2 V		6.5		4.3		5.5	MHz
		4.5 V		33		22		27	
		6 V		38		25		31	
t <sub>w</sub>	Pulse duration, CLK high or low	2 V	75		115		95		ns
		4.5 V	15		23		19		
		6 V	13		20		16		
t <sub>su</sub>	Data before CLK↓	2 V	80		125		105		ns
		4.5 V	16		25		21		
		6 V	14		21		18		
	WS before CLK↓	2 V	80		125		105		
		4.5 V	16		25		21		
		6 V	14		21		18		
t <sub>h</sub>	Data after CLK↓	2 V	0		0		0		ns
		4.5 V	0		0		0		
		6 V	0		0		0		
	WS after CLK↓	2 V	0		0		0		
		4.5 V	0		0		0		
		6 V	0		0		0		

switching characteristics over recommended operating free-air temperature range (unless otherwise noted), C<sub>L</sub> = 50 pF (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25 °C			SN54HC298		SN74HC298		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
f <sub>max</sub>			2 V	6.5			4.3		5.5		MHz
			4.5 V	33			22		27		
			6 V	38			25		31		
t <sub>pd</sub>	CLK	Any	2 V	46	125		190		155		ns
			4.5 V	15	25		38		31		
			6 V	12	21		32		26		
t <sub>t</sub>		Any	2 V	38	75		110		95		ns
			4.5 V	8	15		22		19		
			6 V	6	13		19		16		

C <sub>pd</sub>	Power dissipation capacitance per multiplexer	No load, T <sub>A</sub> = 25 °C	33 pF typ
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NOTE 1: Load circuit and voltage waveforms are shown in Section 1.