

TYPES SN54LS398, SN54LS399
SN74LS398, SN74LS399
QUADRUPLE 2-INPUT MULTIPLEXERS WITH STORAGE
 OCTOBER 1976—REVISED DECEMBER 1983

- Double-Rail Outputs on 'LS398
- Single-Rail Outputs on 'LS399
- 'LS398 is Similar to 'LS298, Which Has Inverted Clock
- Selects One of Two 4-Bit Data Sources and Stores Data Synchronously with System Clock
- Applications:
 - Dual Source for Operands and Constants in Arithmetic Processor; Can Release Processor Register Files for Acquiring New Data
 - Implement Separate Registers Capable of Parallel Exchange of Contents Yet Retain External Load Capability
 - Universal Type Register for Implementing Various Shift Patterns; Even Has Compound Left-Right Capabilities

description

These monolithic quadruple two-input multiplexers with storage provide essentially the equivalent functional capabilities of two separate MSI functions (SN54LS157/SN74LS157 and SN54LS175/SN74LS175) in a single 16-pin or 20-pin package.

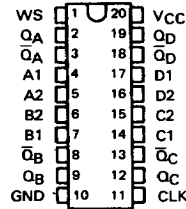
When the word-select input is low, word 1 (A1, B1, C1, D1) is applied to the flip-flops. A high input to word select will cause the selection of word 2 (A2, B2, C2, D2). The selected word is clocked to the output terminals on the positive-going edge of the clock pulse.

Typical power dissipation is 37 milliwatts. SN54LS398 and SN54LS399 are characterized for operation over the full military range of -55°C to 125°C , SN74LS398 and SN74LS399 are characterized for operation from 0°C to 70°C .

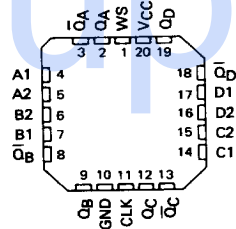
FUNCTION TABLE

INPUTS		OUTPUTS			
WORD SELECT	CLOCK	Q _A	Q _B	Q _C	Q _D
L	↑	a1	b1	c1	d1
H	↑	a2	b2	c2	d2
X	L	Q _{A0}	Q _{B0}	Q _{C0}	Q _{D0}

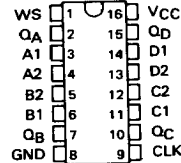
SN54LS398 ... J OR W PACKAGE
 SN74LS398 ... DW, J OR N PACKAGE
 (TOP VIEW)



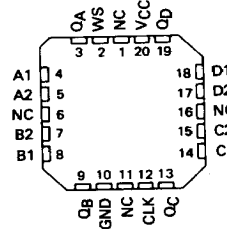
SN54LS398 ... FK PACKAGE
 SN74LS398 ... FN PACKAGE
 (TOP VIEW)



SN54LS399 ... J OR W PACKAGE
 SN74LS399 ... D, J OR N PACKAGE
 (TOP VIEW)



SN54LS399 ... FK PACKAGE
 SN74LS399 ... FN PACKAGE
 (TOP VIEW)



NC - No internal connection

PRODUCTION DATA

This document contains information current as of publication date. Products conform to these specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



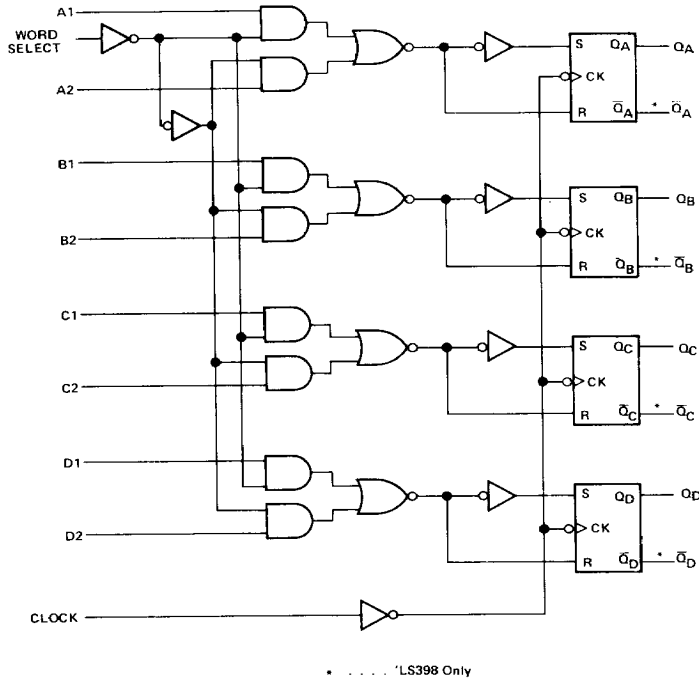
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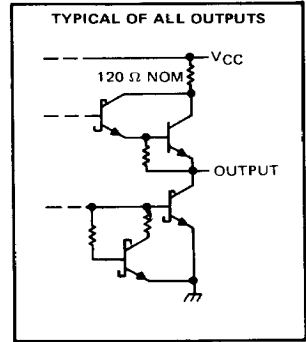
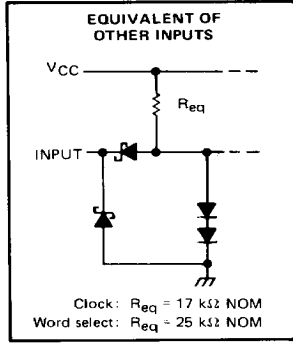
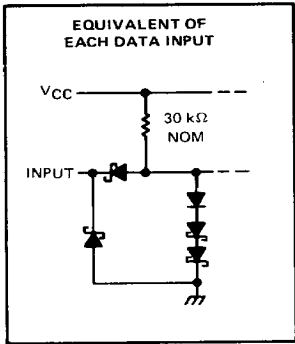
TYPES SN54LS398, SN54LS399, SN74LS398, SN74LS399
QUADRUPLE 2-INPUT MULTIPLEXERS WITH STORAGE

logic diagram



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schematics of inputs and outputs



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TYPES SN54LS398, SN54LS399, SN74LS398, SN74LS399 QUADRUPLE 2-INPUT MULTIPLEXERS WITH STORAGE

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage	7 V
Operating free-air temperature range: SN54LS'	-55°C to 125°C
SN74LS'	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

	SN54LS'			SN74LS'			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-400			-400	μ A
Low-level output current, I_{OL}			4			8	mA
Width of clock pulse, high or low level, t_w		20			20		ns
Setup time, t_{su}	Data	25		25			ns
	Word select	45		45			
Hold time, t_h	Data	0		0			ns
	Word select	0		0			
Operating free-air temperature, T_A		-55	125		0	70	°C

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

PARAMETER	TEST CONDITIONS†	SN54LS'			SN74LS'			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH} High-level input voltage		2			2			V
V_{IL} Low-level input voltage				0.7			0.8	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}$, $I_I = -18 \text{ mA}$			-1.5			-1.5	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = V_{IL \text{ max}}$, $I_{OH} = -400 \mu\text{A}$	2.5	3.4		2.7	3.4		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = V_{IL \text{ max}}$							V
				$I_{OL} = 4 \text{ mA}$	0.25	0.4		
				$I_{OL} = 8 \text{ mA}$			0.35	0.5
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}$, $V_I = 7 \text{ V}$				0.1		0.1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}$, $V_I = 2.7 \text{ V}$				20		20	μ A
I_{IL} Low-level input current	$V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$				-0.4		-0.4	mA
I_{OS} Short-circuit output current§	$V_{CC} = \text{MAX}$	-20		-100	-20		-100	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}$, See Note 2		7.3	13		7.3	13	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ \text{C}$.

§ Not more than one output should be shorted at a time, duration of the short-circuit should not exceed one second.

NOTE 2: With all outputs open and all inputs except clock low, I_{CC} is measured after applying a momentary 4.5 V, followed by ground, to the clock input.

switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ \text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{pLH} Propagation delay time, low-to-high-level output	$C_L = 15 \text{ pF}$, $R_L = 2 \text{ k}\Omega$		18	27	ns
t_{pHL} Propagation delay time, high-to-low-level output	See Note 3		21	32	

NOTE 3: See General Information Section for load circuits and voltage waveforms.



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