

SN54LS604, SN54LS606, SN54LS607, SN74LS604, SN74LS606, SN74LS607 OCTAL 2-INPUT MULTIPLEXED LATCHES

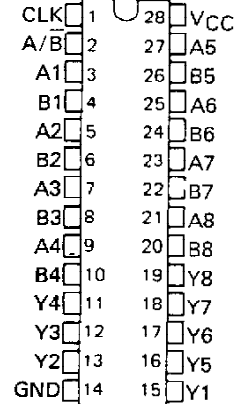
SDLS183

D2545, JULY 1979 - REVISED MARCH 1988

(TIM99604, TIM99606, TIM99607)

- **Choice of Outputs:**
Three State ('LS604, 'LS606)
Open-Collector ('LS607)
- **16 D-Type Registers, One for Each Data Input**
- **Multiplexer Selects Stored Data from Either A Bus or B Bus**
- **Application Oriented:**
Maximum Speed ('LS604)
Glitch-Free Operation ('LS606, 'LS607)

SN54LS604, SN54LS606, SN54LS607 . . . JD PACKAGE
SN74LS604, SN74LS606, SN74LS607 . . . JD OR N PACKAGE
(TOP VIEW)



description

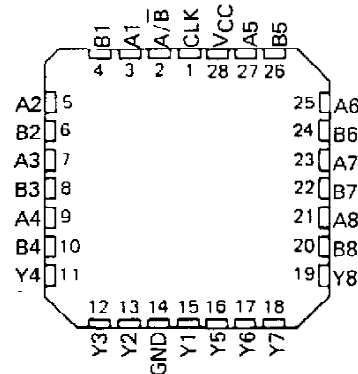
The 'LS604, 'LS606, and 'LS607 multiplexed latches are ideal for storing data from two input buses, A and B, and providing the output bus with stored data from either the A or B register.

The clock loads data on the positive-going (low-level to high-level) transition. The clock pin also controls the active and high-impedance states of the outputs. When the clock pin is low, the outputs are in the high-impedance or off state. When the clock pin is high, the outputs are enabled.

The 'LS604 is optimized for high-speed operation. The 'LS606 and 'LS607 are especially designed to eliminate decoding voltage spikes.

These functions are ideal for interface from a 16-bit microprocessor to a 64K RAM board. The row and column addresses can be loaded as one word from the microprocessor and then multiplexed sequentially to the RAM during the time that RAS and CAS are active.

SN54LS604, SN54LS606, SN54LS607 . . . FK PACKAGE
(TOP VIEW)



The SN54LS604, SN54LS606, and SN54LS607 are characterized for operation over the full military temperature range of -55°C to 125°C; the SN74LS604, SN74LS606, and SN74LS607 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS				CLOCK	OUTPUTS	
A1-A8	B1-B8	SELECT A/B	Y1-Y8			
A data	B data	L	↑	B data		
A data	B data	H	↑	A data		
X	X	X	L	Z or Off		
X	X	L	H	B register stored data		
X	X	H	H	A register stored data		

H = high level (steady state)

L = low level (steady state)

X = irrelevant

Z = high-impedance state

Off = H if pull-up resistor is connected to open-collector output

↑ = transition from low to high level

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

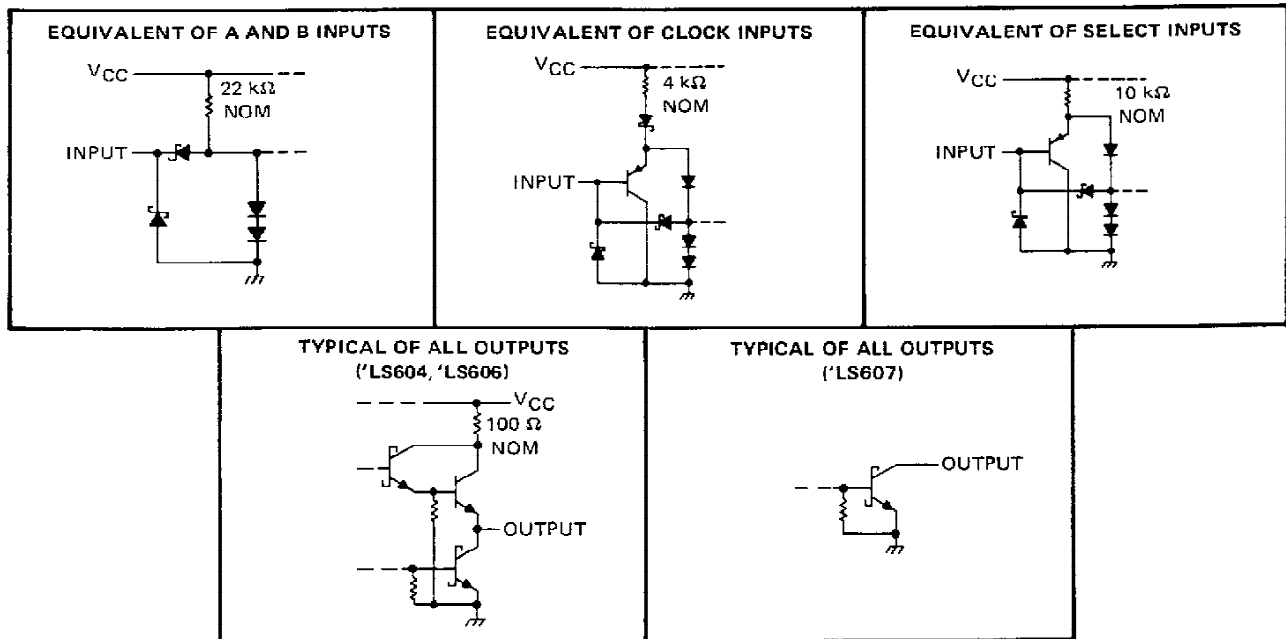
TEXAS
INSTRUMENTS

POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

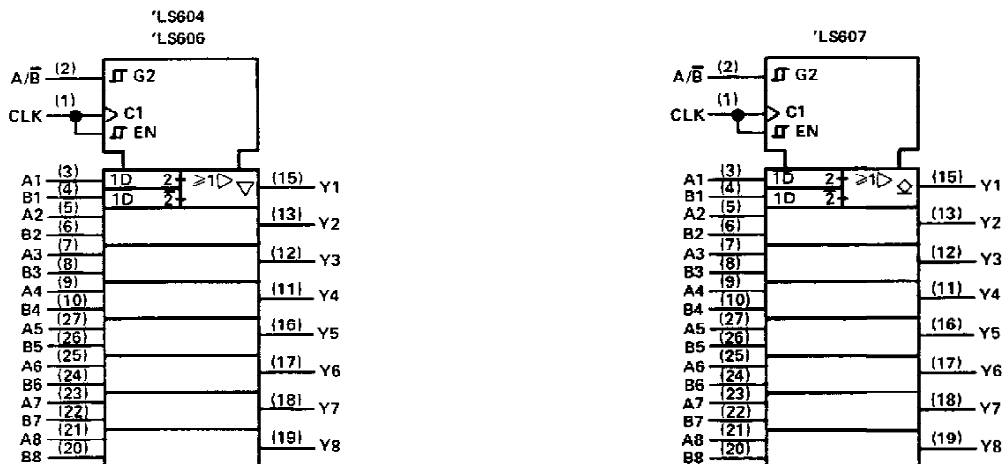
SN54LS604, SN54LS606, SN54LS607, SN74LS604, SN74LS606, SN74LS607

OCTAL 2-INPUT MULTIPLEXED LATCHES

schematics of inputs and outputs



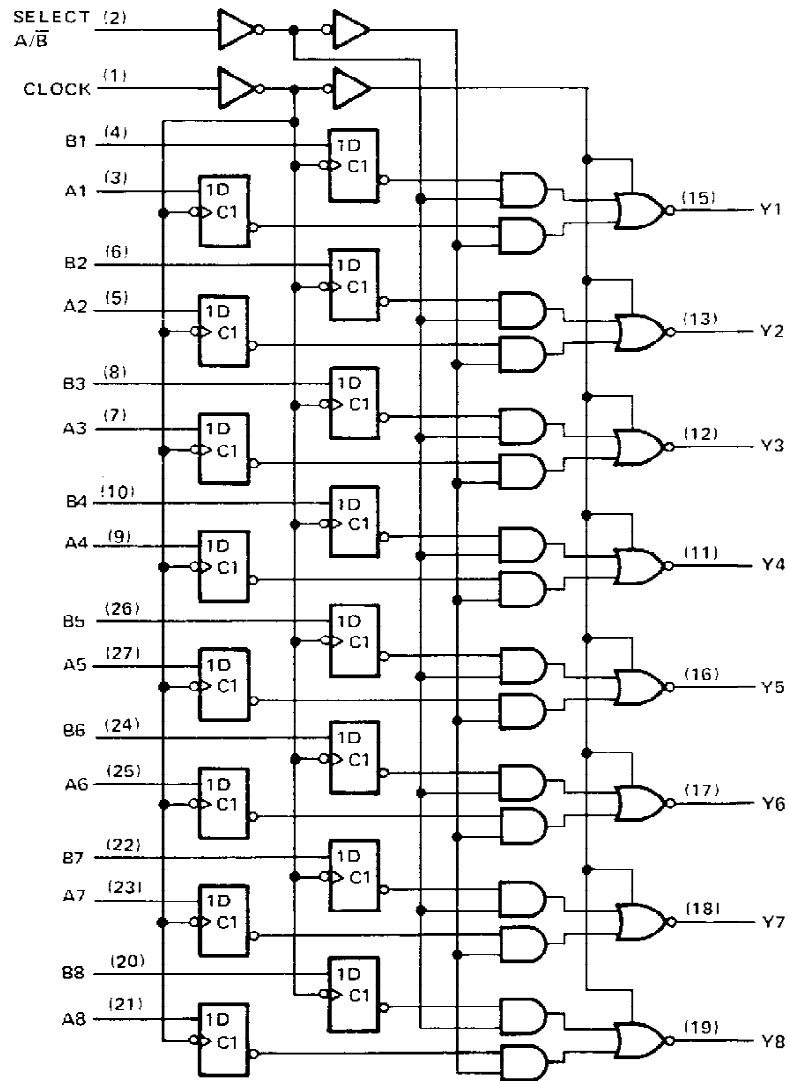
logic symbols†



†These symbols are in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12. Pin numbers shown are for JD and N packages.

SN54LS604, SN54LS606, SN54LS607, SN74LS604, SN74LS606, SN74LS607
OCTAL 2-INPUT MULTIPLEXED LATCHES

logic diagram (positive logic)



TEXAS
INSTRUMENTS

POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

SN54LS604, SN54LS606, SN74LS604, SN74LS606

OCTAL 2-INPUT MULTIPLEXED LATCHES WITH 3-STATE OUTPUTS

recommended operating conditions

	SN54LS604 SN54LS606			SN74LS604 SN74LS606			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC} (see Note 1)	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-1			-2.6	mA
Low-level output current, I_{OL}			12			24	mA
Width of clock pulse, t_W	20			20			ns
Setup time, t_{SU}	20†			20†			ns
Hold time, t_H	0†			0†			ns
Operating free-air temperature, T_A	-55		125	0		70	°C

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

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

PARAMETER	TEST CONDITIONS†	SN54LS604 SN54LS606			SN74LS604 SN74LS606			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	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OH} = \text{MAX}$			2.4	3.1	2.4	3.1	V		
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OL} = 12 \text{ mA}$			0.25			0.4	V		
								0.35	0.5		
I_{OZH}	Off-state output current, high-level voltage applied	$V_{CC} = \text{MAX}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, V_O = 2.7 \text{ V}$			20			20	µA		
I_{OZL}	Off-state output current, low-level voltage applied	$V_{CC} = \text{MAX}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, V_O = 0.4$			-20			-20	µA		
I_I	Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7 \text{ V}$			A, B CLK, SELECT			0.1 0.1	0.1	mA	
I_{IH}	High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			A, B CLK, SELECT			20 20	20	µA	
I_{IL}	Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			A, B CLK, SELECT			-0.4 -0.2	-0.4	mA	
I_{OS}	Short-circuit output current§	$V_{CC} = \text{MAX}$			-30			-130	-130	mA	
I_{CC}	Supply current	$V_{CC} = \text{MAX},$ See Note 2			55			70	55	70	mA

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

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

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

NOTE 2: I_{CC} is tested with all inputs grounded and all outputs open.

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

PARAMETER	FROM (INPUT)	TEST CONDITIONS	'LS604			'LS606			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Select A/ \bar{B} (Data: A = H, B = L)	$C_L = 45 \text{ pF}, R_L = 667 \Omega,$ See Note 3	15	25		36	50	ns	
t_{PHL}			23	35		16	30		
t_{PLH}	Select A/ \bar{B} (Data: A = L, B = H)		31	45		22	35	ns	
t_{PHL}			19	30		22	35		
t_{PZH}	Clock		19	30		27	40	ns	
t_{PZL}			28	40		35	50		
t_{PHZ}	Clock	$C_L = 5 \text{ pF}, R_L = 667 \Omega,$ See Note 3	20	30		20	30	ns	
t_{PLZ}		15	25		15	25			

t_{PLH} ≡ propagation delay time, low-to-high-level output

t_{PHL} ≡ propagation delay time, high-to-low-level output

t_{PZH} ≡ output enable time to high level

t_{PZL} ≡ output enable time to low level

t_{PHZ} ≡ output disable time from high level

t_{PLZ} ≡ output disable time from low level

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

TEXAS
INSTRUMENTS

POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

SN54LS607, SN74LS607

OCTAL 2-INPUT MULTIPLEXED LATCHES WITH OPEN-COLLECTOR OUTPUTS

recommended operating conditions

	SN54LS607			SN74LS607			UNIT		
	MIN	NOM	MAX	MIN	NOM	MAX			
Supply voltage, V_{CC} (see Note 1)	4.5	5	5.5	4.75	5	5.25	V		
High-level output voltage, V_{OH}	5.5			5.5			V		
Low-level output current, I_{OL}	12			24			mA		
Width of clock pulse, t_w	20			20			ns		
Setup time, t_{su}	20†			20†			ns		
Hold time, t_h	0†			0†			ns		
Operating free-air temperature, T_A	-55			125			0	70	°C

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

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

PARAMETER	TEST CONDITIONS†	SN54LS607		SN74LS607		UNIT	
		MIN	TYP‡	MAX	MIN		TYP‡
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
I_{OH} High-level output current	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = V_{IL \text{ max}}$, $V_{OH} = 5.5 \text{ V}$	250		250		μA	
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = V_{IL \text{ max}}$	$I_{OL} = 12 \text{ mA}$	0.25	0.4	0.25	0.4	V
		$I_{OL} = 24 \text{ mA}$			0.35	0.5	
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}$, $V_I = 7 \text{ V}$	A, B	0.1		0.1		mA
		CLK, SELECT	0.1		0.1		
I_{IH} High-level input current	$V_{CC} = \text{MAX}$, $V_I = 2.7 \text{ V}$	A, B	20		20		μA
		CLK, SELECT	20		20		
I_{IL} Low-level input current	$V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$	A, B	-0.4		-0.4		mA
		CLK, SELECT	-0.2		-0.2		
I_{CC} Supply current	$V_{CC} = \text{MAX}$, See Note 2	40	60	40	60	mA	

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

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

NOTE 2: I_{CC} is tested with all inputs grounded and all outputs open.

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

PARAMETER	FROM (INPUT)	TEST CONDITIONS	LS607			UNIT
			MIN	TYP	MAX	
t_{PLH}	Select A/\bar{B}	$C_L = 45 \text{ pF}$, $R_L = 667 \Omega$, See Note 3	51		70	ns
t_{PHL}	(Data: A = H, B = L)		21		30	
t_{PLH}	Select A/\bar{B}		28		40	ns
t_{PHL}	(Data: A = L, B = H)		28		40	
t_{PLH}	Clock		30		45	ns
t_{PHL}			32		45	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



IMPORTANT NOTICE

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Certain applications using semiconductor products may involve potential risks of death, personal injury, or severe property or environmental damage ("Critical Applications").

TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards should be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.

IMPORTANT NOTICE

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Certain applications using semiconductor products may involve potential risks of death, personal injury, or severe property or environmental damage ("Critical Applications").

TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards should be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used.

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.