

SN54LS375, SN74LS375 4-BIT BISTABLE LATCHES

SDLS166 OCTOBER 1976 — REVISED MARCH 1988

- Supply Voltage and Ground on Corner Pins To Simplify P-C Board Layout

description

The SN54LS375 and SN74LS375 bistable latches are electrically and functionally identical to the SN54LS75 and SN74LS75, respectively. Only the arrangement of the terminals has been changed in the SN54LS375 and SN74LS375.

These latches are ideally suited for use as temporary storage for binary information between processing units and input/output or indicator units. Information present at a data (D) input is transferred to the Q output when the enable (C) is high and the Q output will follow the data input as long as the enable remains high. When the enable goes low, the information (that was present at the data input at the time the transition occurred) is retained at the Q output until the enable goes high.

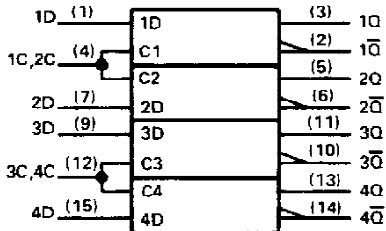
All inputs are diode-clamped to minimize transmission-line effects and simplify system design. The SN54LS375 is characterized for operation over the full military temperature range of -55°C to 125°C; SN74LS375 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(EACH LATCH)

INPUTS		OUTPUTS	
D	G	Q	\bar{Q}
L	H	L	H
H	H	H	L
X	L	Q_0	\bar{Q}_0

H = high level, L = low level, X = irrelevant
 Q_0 = the level of Q before the high-to-low transition of C.

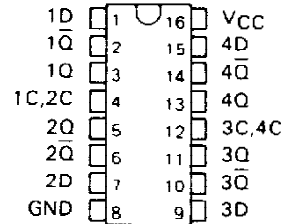
logic symbol†



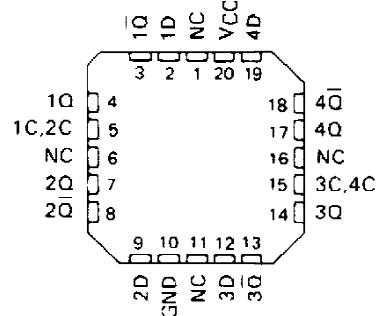
† This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, N, and W packages.

SN54LS375 . . . J OR W PACKAGE
SN74LS375 . . . D OR N PACKAGE

(TOP VIEW)

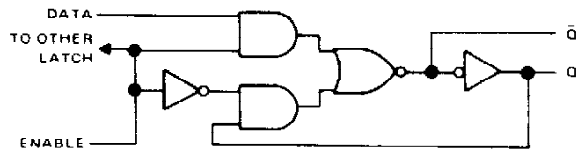


SN54LS375 . . . FK PACKAGE
(TOP VIEW)

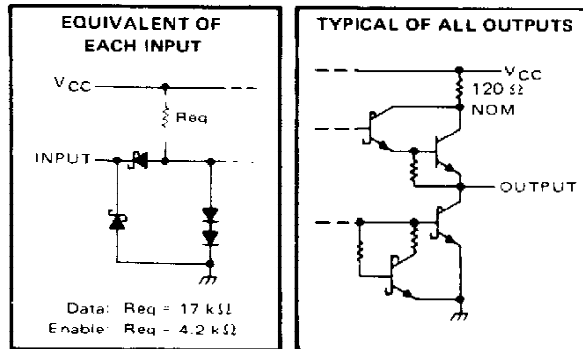


NC - No internal connection

logic diagram (each latch)



schematics of inputs and outputs



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

SN54LS375, SN74LS375

4-BIT BISTABLE LATCHES

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: SN54LS375	-55°C to 125°C
SN74LS375	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

		SN54LS375			SN74LS375			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V		
V_{IH}	High-level input voltage	2			2			V		
V_{IL}	Low-level input voltage	0.7			0.8			V		
I_{OH}	High-level output current	-0.4			-0.4			mA		
I_{OL}	Low-level output current	4			8			mA		
t_w	Width of enabling pulse	20			20			ns		
t_{setup}	Setup time	20			20			ns		
t_{hold}	Hold time	0			0			ns		
T_A	Operating free-air temperature	-55			125			0	70	°C

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

PARAMETER	TEST CONDITIONS †	SN54LS375			SN74LS375			UNIT	
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX		
V_{IK}	$V_{CC} = \text{MIN.}$, $I_I = -18 \text{ mA}$	-1.5			-1.5			V	
V_{OH}	$V_{CC} = \text{MIN.}$, $V_{IH} = 2 \text{ V.}$, $V_{IL} = \text{MAX}$ $I_{OH} = -0.4 \text{ mA}$	2.5	3.5		2.7	3.5		V	
V_{OL}	$V_{CC} = \text{MIN.}$, $V_{IH} = 2 \text{ V.}$, $V_{IL} = \text{MAX}$	$I_{OL} = 4 \text{ mA}$		0.25	0.4	0.25		V	
		$I_{OL} = 8 \text{ mA}$		0.35		0.5			
I_I	$V_{CC} = \text{MAX.}$, $V_I = 7 \text{ V}$	D input		0.1		0.1		mA	
		C input		0.4		0.4			
I_{IH}	$V_{CC} = \text{MAX.}$, $V_I = 2.7 \text{ V}$	D input		20		20		µA	
		C input		80		80			
I_{IL}	$V_{CC} = \text{MAX.}$, $V_I = 0.4 \text{ V}$	D input		-0.4		-0.4		mA	
		C input		-1.6		-1.6			
I_{OS}	$V_{CC} = \text{MAX.}$	-20		-100	-20		-100	mA	
I_{CC}	$V_{CC} = \text{MAX.}$, See Note 2	6.3		12		6.3		12	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.

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

switching characteristics, $V_{CC} = 5 \text{ V.}$, $T_A = 25^\circ \text{C}$ (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	D	O	$R_L = 2 \text{ k}\Omega$	$C_L = 15 \text{ pF}$	15	27	ns	
t_{PHL}					9	17		
t_{PLH}	D	\bar{O}			12	20	ns	
t_{PHL}					7	15		
t_{PLH}	C	O			15	27	ns	
t_{PHL}					14	25		
t_{PLH}	C	\bar{O}			16	30	ns	
t_{PHL}					7	15		

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 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.