

SN54HC373, SN74HC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS140B – DECEMBER 1982 – REVISED MAY 1997

- Eight High-Current Latches in a Single Package
- High-Current 3-State True Outputs Can Drive up to 15 LSTTL Loads
- Full Parallel Access for Loading
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

These 8-bit latches feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

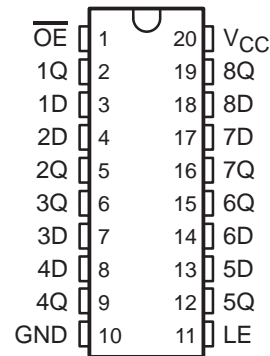
The eight latches of the 'HC373 are transparent D-type latches. While the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is taken low, the Q outputs are latched at the levels that were set up at the D inputs.

An output-enable (\overline{OE}) input places the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without interface or pullup components.

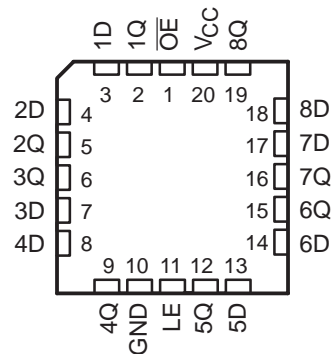
\overline{OE} does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are off.

The SN54HC373 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74HC373 is characterized for operation from -40°C to 85°C .

SN54HC373 . . . J OR W PACKAGE
SN74HC373 . . . DB, DW, N, OR PW PACKAGE
(TOP VIEW)



SN54HC373 . . . FK PACKAGE
(TOP VIEW)



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is 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.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1997, Texas Instruments Incorporated

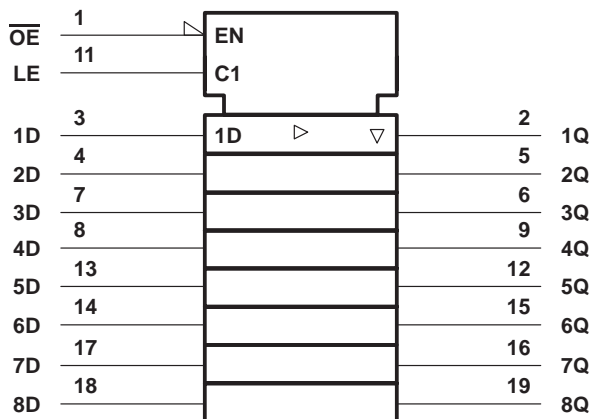
SN54HC373, SN74HC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS140B – DECEMBER 1982 – REVISED MAY 1997

FUNCTION TABLE
(each latch)

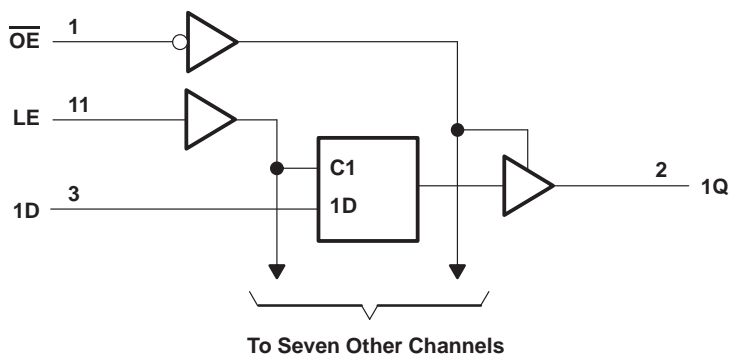
INPUTS			OUTPUT
\overline{OE}	LE	D	Q
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



SN54HC373, SN74HC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS140B – DECEMBER 1982 – REVISED MAY 1997

absolute maximum ratings over operating free-air temperature range†

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1)	±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±35 mA
Continuous current through V_{CC} or GND	±70 mA
Package thermal impedance, θ_{JA} (see Note 2): DB package	115°C/W
DW package	97°C/W
N package	67°C/W
PW package	128°C/W
Storage temperature range, T_{stg}	–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.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

		SN54HC373			SN74HC373			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	2	5	6	2	5	6	V
V_{IH}	High-level input voltage	$V_{CC} = 2\text{ V}$		1.5	$V_{CC} = 2\text{ V}$		1.5	V
		$V_{CC} = 4.5\text{ V}$		3.15	$V_{CC} = 4.5\text{ V}$		3.15	
		$V_{CC} = 6\text{ V}$		4.2	$V_{CC} = 6\text{ V}$		4.2	
V_{IL}	Low-level input voltage	$V_{CC} = 2\text{ V}$		0	0.5	$V_{CC} = 2\text{ V}$		V
		$V_{CC} = 4.5\text{ V}$		0	1.35	$V_{CC} = 4.5\text{ V}$		
		$V_{CC} = 6\text{ V}$		0	1.8	$V_{CC} = 6\text{ V}$		
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) time	$V_{CC} = 2\text{ V}$		0	1000	$V_{CC} = 2\text{ V}$		ns
		$V_{CC} = 4.5\text{ V}$		0	500	$V_{CC} = 4.5\text{ V}$		
		$V_{CC} = 6\text{ V}$		0	400	$V_{CC} = 6\text{ V}$		
T_A	Operating free-air temperature	–55	125		–40	85		°C



SN54HC373, SN74HC373
OCTAL TRANSPARENT D-TYPE LATCHES
WITH 3-STATE OUTPUTS

SCLS140B – DECEMBER 1982 – REVISED MAY 1997

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

PARAMETER	TEST CONDITIONS		V _{CC}	T _A = 25°C			SN54HC373		SN74HC373		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	V _I = V _{IH} or V _{IL}	I _{OH} = -20 μA	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		
		I _{OH} = -6 mA	4.5 V	3.98	4.3		3.7		3.84		
			6 V	5.48	5.8		5.2		5.34		
V _{OL}	V _I = V _{IH} or V _{IL}	I _{OL} = 20 μA	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	
		I _{OL} = 6 mA	4.5 V		0.17	0.26		0.4		0.33	
			6 V		0.15	0.26		0.4		0.33	
I _I	V _I = V _{CC} or 0		6 V		±0.1	±100		±1000		±1000	nA
I _{OZ}	V _O = V _{CC} or 0		6 V		±0.01	±0.5		±10		±5	μA
I _{CC}	V _I = V _{CC} or 0, I _O = 0		6 V				8	160		80	μA
C _i			2 V to 6 V		3	10		10		10	pF

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

		V _{CC}	T _A = 25°C		SN54HC373		SN74HC373		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration, LE high	2 V		80		120		100	ns
		4.5 V		16		24		20	
		6 V		14		20		17	
t _{su}	Setup time, data before LE↓	2 V		50		75		63	ns
		4.5 V		10		15		13	
		6 V		9		13		11	
t _h	Hold time, data after LE↓	2 V		20		26		24	ns
		4.5 V		10		13		12	
		6 V		10		13		12	



SN54HC373, SN74HC373
OCTAL TRANSPARENT D-TYPE LATCHES
WITH 3-STATE OUTPUTS

SCLS140B – DECEMBER 1982 – REVISED MAY 1997

switching characteristics over recommended operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			SN54HC373		SN74HC373		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	D	Q	2 V		58	150		225		190	ns
			4.5 V		15	30		45		38	
			6 V		13	26		38		32	
	LE	Any Q	2 V		73	175		265		220	
			4.5 V		18	35		53		44	
			6 V		15	30		45		38	
t _{en}	\overline{OE}	Any Q	2 V		65	150		225		190	ns
			4.5 V		17	30		45		38	
			6 V		14	26		38		32	
t _{dis}	\overline{OE}	Any Q	2 V		50	150		225		190	ns
			4.5 V		15	30		45		38	
			6 V		13	26		38		32	
t _t		Any Q	2 V		28	60		90		75	ns
			4.5 V		8	12		18		15	
			6 V		6	10		15		13	

switching characteristics over recommended operating free-air temperature range, $C_L = 150$ pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			SN54HC373		SN74HC373		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	D	Q	2 V		82	200		300		250	ns
			4.5 V		22	40		60		50	
			6 V		19	34		51		43	
	LE	Any Q	2 V		100	225		335		285	
			4.5 V		24	45		67		57	
			6 V		20	38		57		48	
t _{en}	\overline{OE}	Any Q	2 V		90	200		300		250	ns
			4.5 V		23	40		60		50	
			6 V		19	34		51		43	
t _t		Any Q	2 V		45	210		315		265	ns
			4.5 V		17	42		63		53	
			6 V		13	36		53		45	

operating characteristics, T_A = 25°C

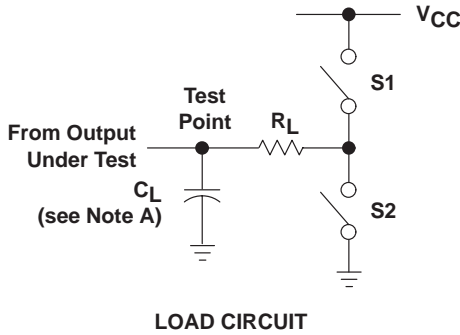
PARAMETER	TEST CONDITIONS	TYP	UNIT
C _{pd} Power dissipation capacitance per latch	No load	100	pF



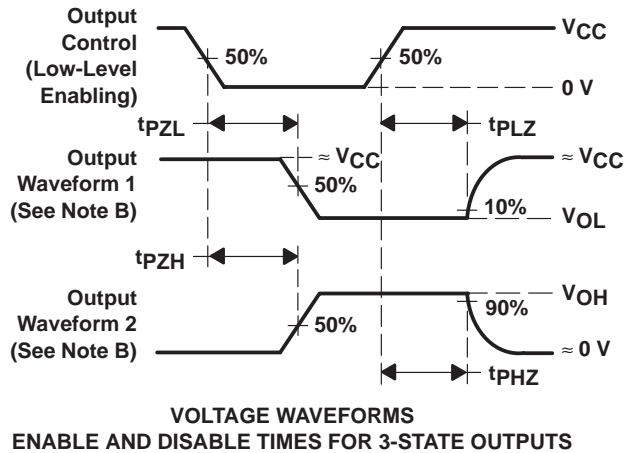
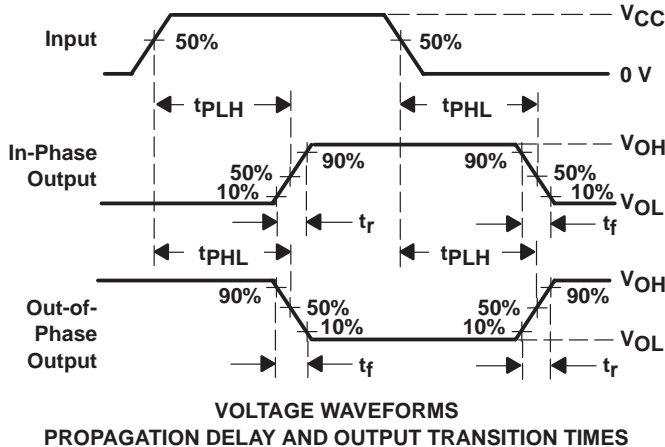
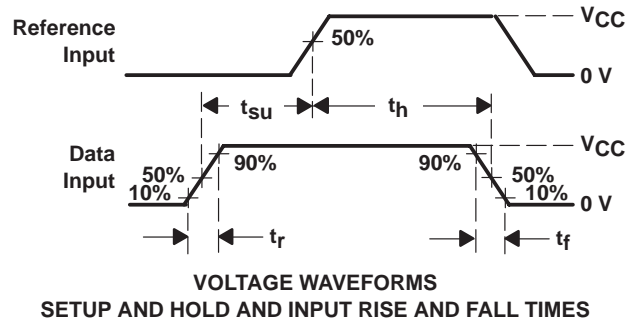
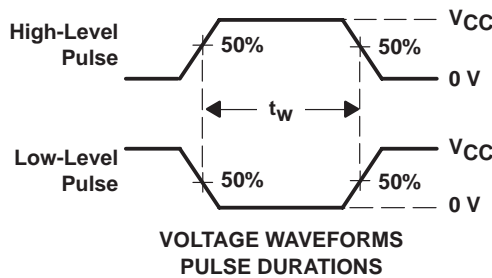
SN54HC373, SN74HC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS140B – DECEMBER 1982 – REVISED MAY 1997

PARAMETER MEASUREMENT INFORMATION



PARAMETER	R_L	C_L	S1	S2
t_{en}	1 k Ω	50 pF or 150 pF	Open	Closed
			Closed	Open
t_{dis}	1 k Ω	50 pF	Open	Closed
			Closed	Open
t_{pd} or t_t	—	50 pF or 150 pF	Open	Open



- NOTES: A. C_L includes probe and test-fixture capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
 D. The outputs are measured one at a time with one input transition per measurement.
 E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 F. t_{PZL} and t_{PZH} are the same as t_{en} .
 G. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

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.