

# SN74HC373A OCTAL TRANSPARENT D-TYPE LATCH WITH 3-STATE OUTPUTS

SCLS458 – MARCH 2001

- **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**

## description

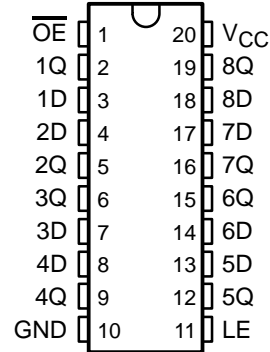
This 8-bit latch features 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. It is particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight latches of the SN74HC373A 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.

DB, N, OR PW PACKAGE  
(TOP VIEW)



## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Tube	SN74HC373AN	SN74HC373AN
	SSOP – DB	Tape and reel	SN74HC373ADBR	HC373A
	TSSOP – PW	Tape and reel	SN74HC373APWR	HC373A

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

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



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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.

**TEXAS  
INSTRUMENTS**

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**recommended operating conditions**

		MIN	NOM	MAX	UNIT
V <sub>CC</sub>	Supply voltage	2	5	6	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 2 V	1.5		V
		V <sub>CC</sub> = 4.5 V	3.15		
		V <sub>CC</sub> = 6 V	4.2		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 2 V	0	0.5	V
		V <sub>CC</sub> = 4.5 V	0	1.35	
		V <sub>CC</sub> = 6 V	0	1.8	
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>		V
V <sub>O</sub>	Output voltage	0	V <sub>CC</sub>		V
t <sub>t</sub>	Input transition (rise and fall) time	V <sub>CC</sub> = 2 V	0	1000	ns
		V <sub>CC</sub> = 4.5 V	0	500	
		V <sub>CC</sub> = 6 V	0	400	
T <sub>A</sub>	Operating free-air temperature	-40		85	°C

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
V <sub>OH</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA	2 V	1.9	1.998	1.9		V
			4.5 V	4.4	4.499	4.4		
			6 V	5.9	5.999	5.9		
		I <sub>OH</sub> = -6 mA	4.5 V	3.98	4.3	3.84		
			6 V	5.48	5.8	5.34		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	2 V	0.1		0.1		V
			4.5 V	0.1		0.1		
			6 V	0.1		0.1		
		I <sub>OL</sub> = 6 mA	4.5 V	0.26		0.33		
			6 V	0.26		0.33		
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0	6 V	±0.1	±100	±1000		nA	
I <sub>OZ</sub>	V <sub>O</sub> = V <sub>CC</sub> or 0	6 V	±0.5		±5		μA	
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0	6 V	8		80		μA	
C <sub>i</sub>		2 V to 6 V	3	10	10		pF	

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SCLS458 – MARCH 2001

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

	V <sub>CC</sub>	T <sub>A</sub> = 25°C		MIN	MAX	UNIT
		MIN	MAX			
t <sub>w</sub> Pulse duration, LE high	2 V	75		95		ns
	4.5 V	15		19		
	6 V	13		16		
t <sub>su</sub> Setup time, data before LE↓	2 V	50		63		ns
	4.5 V	10		13		
	6 V	9		11		
t <sub>h</sub> Hold time, data after LE↓	2 V	20		24		ns
	4.5 V	10		12		
	6 V	10		12		

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t <sub>pd</sub>	D	Q	2 V		55	125		155	ns
			4.5 V		15	25		31	
			6 V		12	21		26	
	LE	Any Q	2 V		71	125		155	
			4.5 V		20	25		31	
			6 V		16	21		26	
t <sub>en</sub>	$\overline{OE}$	Any Q	2 V		60	125		155	ns
			4.5 V		17	25		31	
			6 V		13	21		26	
t <sub>dis</sub>	$\overline{OE}$	Any Q	2 V		44	125		155	ns
			4.5 V		19	25		31	
			6 V		17	21		26	
t <sub>t</sub>		Any Q	2 V		22	60		75	ns
			4.5 V		7	12		15	
			6 V		5	10		13	



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SCLS458 – MARCH 2001

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t <sub>pd</sub>	D	Q	2 V	73	175	220	ns		
			4.5 V	20	35	44			
			6 V	16	30	37			
	LE	Any Q	2 V	90	175	220			
			4.5 V	25	35	44			
			6 V	20	30	37			
t <sub>en</sub>	$\overline{\text{OE}}$	Any Q	2 V	78	175	220	ns		
			4.5 V	21	35	44			
			6 V	17	30	37			

operating characteristics, T<sub>A</sub> = 25°C

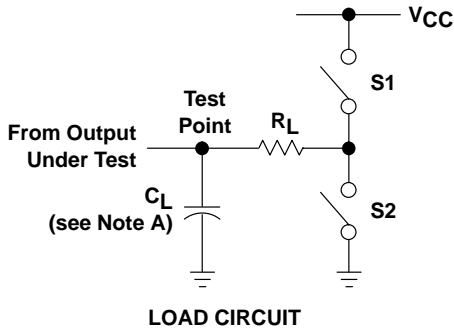
PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	No load	100	pF



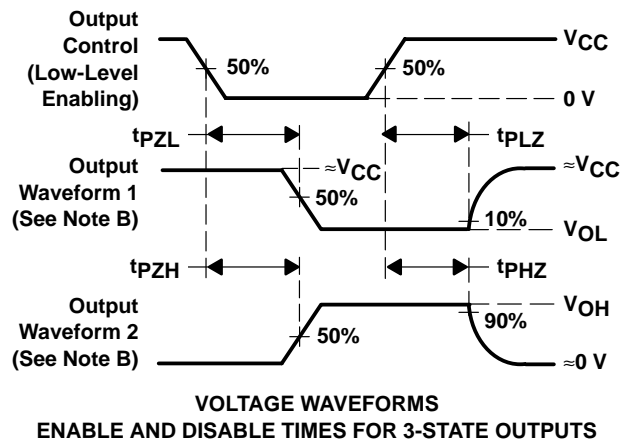
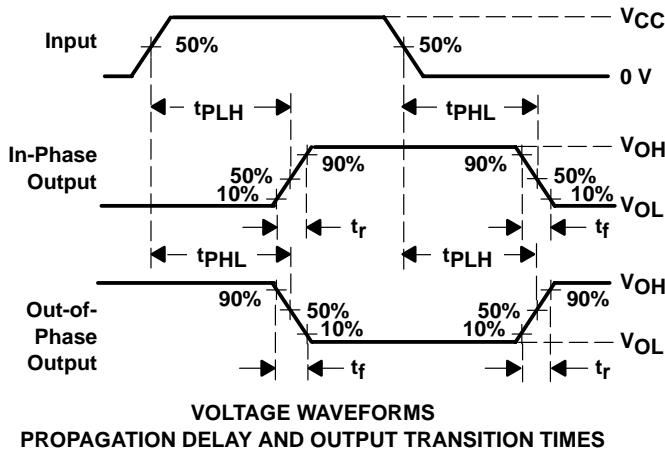
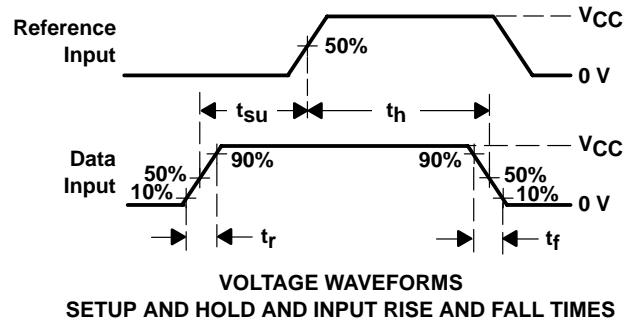
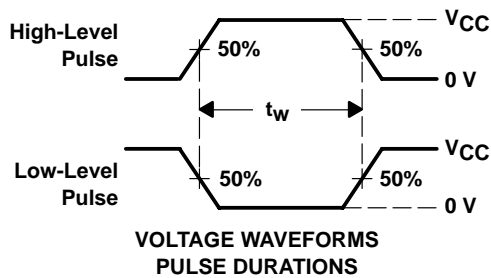
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SCLS458 – MARCH 2001

## PARAMETER MEASUREMENT INFORMATION



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



- NOTES:
- $C_L$  includes probe and test-fixture capacitance.
  - 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.
  - 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.
  - The outputs are measured one at a time with one input transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74HC373ANSR	ACTIVE	SOP	NS	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM		HC373A	Samples

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSELETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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# MECHANICAL DATA

NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



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