

# 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

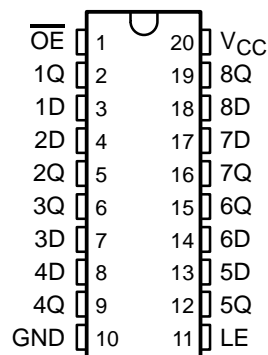
This 8-bit latch features 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. It is particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

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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**TEXAS  
INSTRUMENTS**

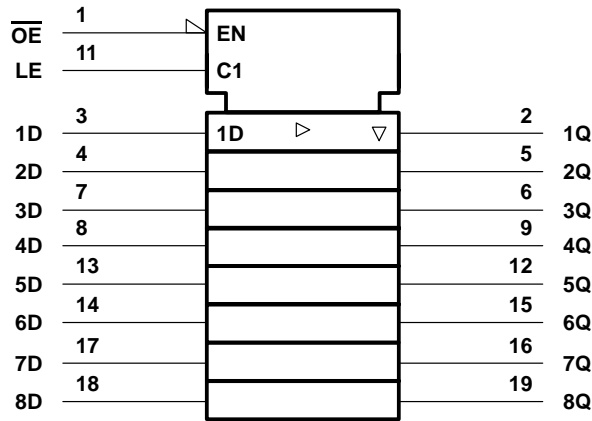
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WITH 3-STATE OUTPUTS

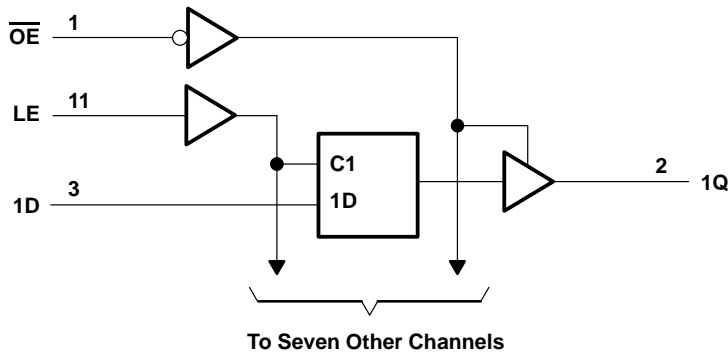
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logic symbol†



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

logic diagram (positive logic)



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)	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 1)	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	$\pm 35$ mA
Continuous current through $V_{CC}$ or GND	$\pm 70$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DB package	70°C/W
N package	69°C/W
PW package	83°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 51-7.

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**recommended operating conditions**

		MIN	NOM	MAX	UNIT
$V_{CC}$	Supply voltage	2	5	6	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2\text{ V}$	1.5		V
		$V_{CC} = 4.5\text{ V}$	3.15		
		$V_{CC} = 6\text{ V}$	4.2		
$V_{IL}$	Low-level input voltage	$V_{CC} = 2\text{ V}$	0	0.5	V
		$V_{CC} = 4.5\text{ V}$	0	1.35	
		$V_{CC} = 6\text{ V}$	0	1.8	
$V_I$	Input voltage	0		$V_{CC}$	V
$V_O$	Output voltage	0		$V_{CC}$	V
$t_t$	Input transition (rise and fall) time	$V_{CC} = 2\text{ V}$	0	1000	ns
		$V_{CC} = 4.5\text{ V}$	0	500	
		$V_{CC} = 6\text{ V}$	0	400	
$T_A$	Operating free-air temperature	–40		85	°C

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

PARAMETER	TEST CONDITIONS	$V_{CC}$	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
			MIN	TYP	MAX			
$V_{OH}$	$V_I = V_{IH}\text{ or }V_{IL}$	$I_{OH} = -20\text{ }\mu\text{A}$	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		
		$I_{OH} = -6\text{ mA}$	4.5 V	3.98	4.3	3.84		
		$I_{OH} = -7.8\text{ mA}$	6 V	5.48	5.8	5.34		
$V_{OL}$	$V_I = V_{IH}\text{ or }V_{IL}$	$I_{OL} = 20\text{ }\mu\text{A}$	2 V			0.1	0.1	V
			4.5 V			0.1	0.1	
			6 V			0.1	0.1	
		$I_{OL} = 6\text{ mA}$	4.5 V			0.26	0.33	
		$I_{OL} = 7.8\text{ mA}$	6 V			0.26	0.33	
$I_I$	$V_I = V_{CC}\text{ or }0$	6 V		$\pm 0.1$	$\pm 100$		$\pm 1000$	nA
$I_{OZ}$	$V_O = V_{CC}\text{ or }0$	6 V			$\pm 0.5$		$\pm 5$	$\mu\text{A}$
$I_{CC}$	$V_I = V_{CC}\text{ or }0, I_O = 0$	6 V			8		80	$\mu\text{A}$
$C_i$		2 V to 6 V		3	10		10	pF

# SN74HC373A

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### WITH 3-STATE OUTPUTS

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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>	$\overline{\text{OE}}$	Any Q	2 V		60	125		155	ns
			4.5 V		17	25		31	
			6 V		13	21		26	
t <sub>dis</sub>	$\overline{\text{OE}}$	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	



**SN74HC373A**  
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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)	$V_{CC}$	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
				MIN	TYP	MAX			
$t_{pd}$	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	
$t_{en}$	$\overline{OE}$	Any Q	2 V		78	175		220	ns
			4.5 V		21	35		44	
			6 V		17	30		37	

operating characteristics,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance	No load	100	pF



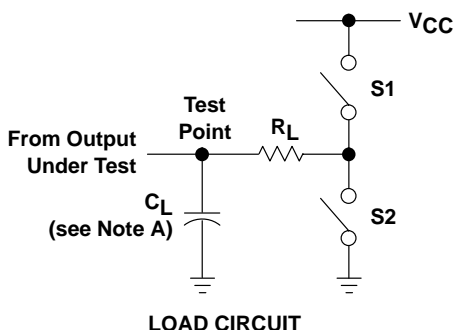
# SN74HC373A

## OCTAL TRANSPARENT D-TYPE LATCH

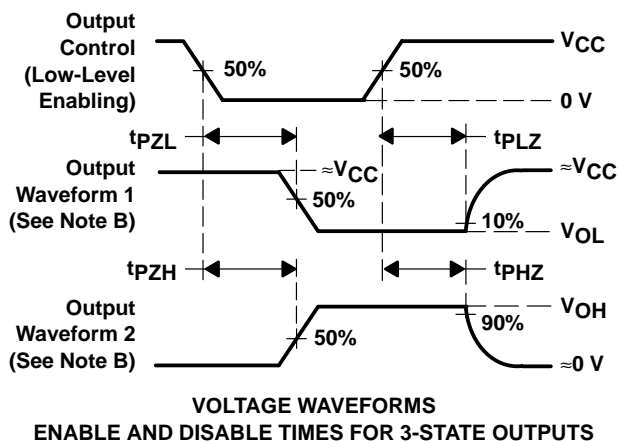
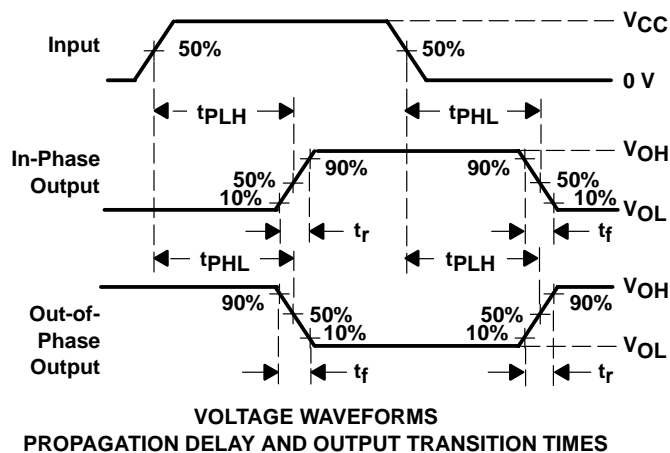
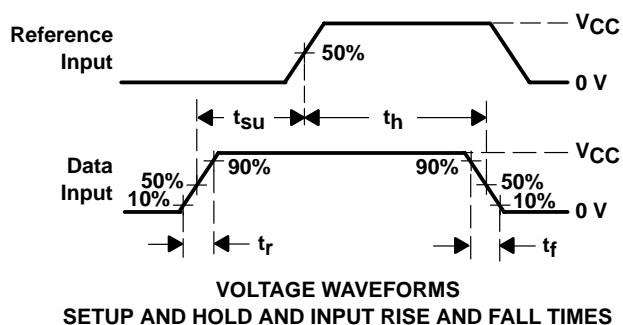
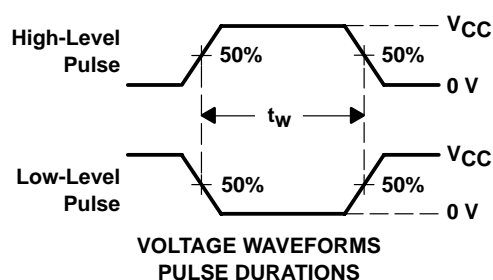
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#### PARAMETER MEASUREMENT INFORMATION



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 part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN74HC373AN.A	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	See SN74HC373AN	SN74HC373AN
<a href="#">SN74HC373ANSR</a>	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-	HC373A
SN74HC373ANSR.A	Active	Production	SOP (NS)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	See SN74HC373ANSR	HC373A
SN74HC373APWR.A	Active	Production	TSSOP (PW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	See SN74HC373APWR	HC373A

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts 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.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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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.



N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

NOTES:

- A. All linear dimensions are in inches (millimeters).  
B. This drawing is subject to change without notice.
-  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).  
 The 20 pin end lead shoulder width is a vendor option, either half or full width.



# EXAMPLE BOARD LAYOUT

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4220206/A 02/2017

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220206/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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