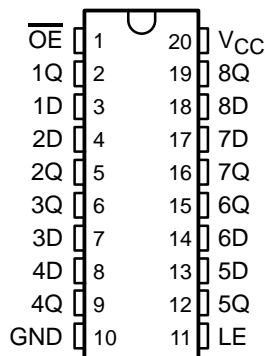


SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

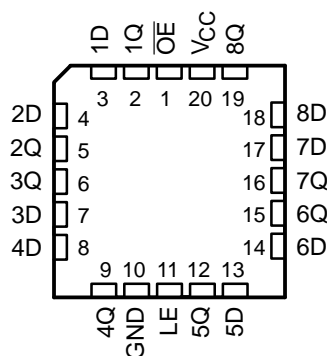
SCLS235B – OCTOBER 1995 – REVISED AUGUST 1996

- Operating Range 2-V to 5.5-V V_{CC}
- EPIC™ (Enhanced-Performance Implanted CMOS) Process
- High Latch-Up Immunity Exceeds 250 mA Per JEDEC Standard JESD-17
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- 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

SN54AHC373 . . . J OR W PACKAGE
SN74AHC373 . . . DB, DW, N, OR PW PACKAGE
(TOP VIEW)



SN54AHC373 . . . FK PACKAGE
(TOP VIEW)



description

The 'AHC373 are octal transparent D-type latches.

When the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is low, the Q outputs are latched at the logic levels of the data (D) inputs.

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low) 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 in the high-impedance state.

The SN54AHC373 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74AHC373 is characterized for operation from -40°C to 85°C .

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**

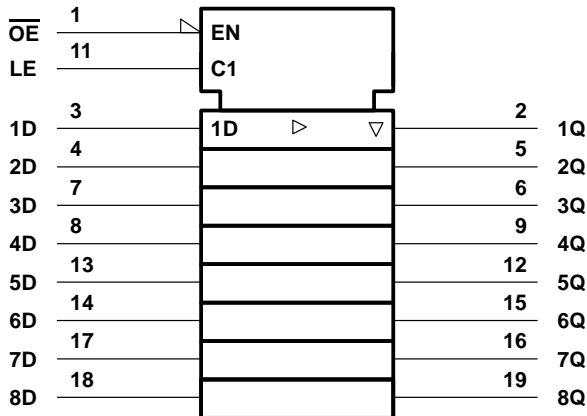
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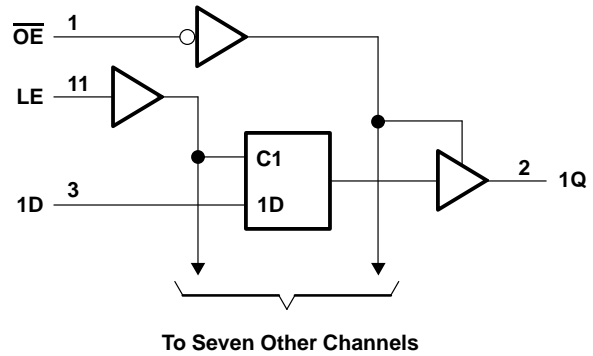
SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS235B – OCTOBER 1995 – REVISED AUGUST 1996

logic symbol†



logic diagram (positive logic)



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

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

Supply voltage range, V_{CC}	-0.5 V to 7 V
Input voltage range, V_I (see Note 1)	-0.5 V to 7 V
Output voltage range, V_O (see Note 1)	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	-20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	± 20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 25 mA
Continuous current through V_{CC} or GND	± 75 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2):	
DB package	0.6 W
DW package	1.6 W
N package	1.3 W
PW package	0.7 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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.

SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS235B – OCTOBER 1995 – REVISED AUGUST 1996

recommended operating conditions (see Note 3)

		SN54AHC373		SN74AHC373		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	2	5.5	2	5.5	V
V_{IH}	High-level input voltage	$V_{CC} = 2\text{ V}$		1.5		V
		$V_{CC} = 3\text{ V}$		2.1		
		$V_{CC} = 5.5\text{ V}$		3.85		
V_{IL}	Low-level input voltage	$V_{CC} = 2\text{ V}$		0.5	0.5	V
		$V_{CC} = 3\text{ V}$		0.9	0.9	
		$V_{CC} = 5.5\text{ V}$		1.65	1.65	
V_I	Input voltage	0	5.5	0	5.5	V
V_O	Output voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current	$V_{CC} = 2\text{ V}$		-50		μA
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		-4		mA
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		-8		mA
I_{OL}	Low-level output current	$V_{CC} = 2\text{ V}$		50		μA
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		4		mA
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		8		
$\Delta t/\Delta v$	Input transition rise or fall rate	$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$		100		ns/V
		$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$		20		
T_A	Operating free-air temperature	-55	125	-40	85	$^{\circ}\text{C}$

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

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

PARAMETER	TEST CONDITIONS	V_{CC}	$T_A = 25^{\circ}\text{C}$			SN54AHC373		SN74AHC373		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	$I_{OH} = -50\ \mu\text{A}$	2 V	1.9			1.9		1.9	V	
		3 V	2.9			2.9		2.9		
		4.5 V	4.4			4.4		4.4		
	$I_{OH} = -4\text{ mA}$	3 V	2.58			2.48		2.48		
		4.5 V	3.94			3.8		3.8		
V_{OL}	$I_{OL} = 50\ \mu\text{A}$	2 V			0.1		0.1	0.1	V	
		3 V			0.1		0.1	0.1		
		4.5 V			0.1		0.1	0.1		
	$I_{OL} = 4\text{ mA}$	3 V			0.36		0.5	0.44		
		4.5 V			0.36		0.5	0.44		
I_I	$V_I = V_{CC}$ or GND	5.5 V			± 0.1		± 1	± 1	μA	
I_{OZ}	$V_I = V_{IH}$ or V_{IL} , $V_O = V_{CC}$ or GND	5.5 V			± 0.25		± 2.5	± 2.5	μA	
I_{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		40	40	μA	
C_i	$V_I = V_{CC}$ or GND	5 V		4	10			10	pF	
C_o	$V_O = V_{CC}$ or GND	5 V		6					pF	

SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS235B – OCTOBER 1995 – REVISED AUGUST 1996

timing requirements over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

		$T_A = 25^\circ\text{C}$		SN54AHC373		SN74AHC373		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, \overline{LE} high	5		5		5		ns
t_{su}	Setup time, data before $\overline{LE}\downarrow$	4		4		4		ns
t_h	Hold time, data after $\overline{LE}\downarrow$	1		1		1		ns

timing requirements over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

		$T_A = 25^\circ\text{C}$		SN54AHC373		SN74AHC373		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, \overline{LE} high	5		5		5		ns
t_{su}	Setup time, data before $\overline{LE}\downarrow$	4		4		4		ns
t_h	Hold time, data after $\overline{LE}\downarrow$	1		1		1		ns

switching characteristics over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	SN54AHC373				UNIT	
				$T_A = 25^\circ\text{C}$			MIN		MAX
				MIN	TYP	MAX			
t_{PLH}^*	D	Q	$C_L = 15\text{ pF}$	7.3	11.4	1	13.5	ns	
t_{PHL}^*				7.3	11.4	1	13.5		
t_{PLH}^*	LE	Q	$C_L = 15\text{ pF}$	7	11	1	13	ns	
t_{PHL}^*				7	11	1	13		
t_{PZH}^*	\overline{OE}	Q	$C_L = 15\text{ pF}$	7.3	11.4	1	13.5	ns	
t_{PZL}^*				7.3	11.4	1	13.5		
t_{PHZ}^*	\overline{OE}	Q	$C_L = 15\text{ pF}$	7	10	1	12	ns	
t_{PLZ}^*				7	10	1	12		
t_{PLH}	D	Q	$C_L = 50\text{ pF}$	9.8	14.9	1	17	ns	
t_{PHL}				9.8	14.9	1	17		
t_{PLH}	LE	Q	$C_L = 50\text{ pF}$	9.5	14.5	1	16.5	ns	
t_{PHL}				9.5	14.5	1	16.5		
t_{PZH}	\overline{OE}	Q	$C_L = 50\text{ pF}$	9.8	14.9	1	17	ns	
t_{PZL}				9.8	14.9	1	17		
t_{PHZ}	\overline{OE}	Q	$C_L = 50\text{ pF}$	9.5	13.2	1	15	ns	
t_{PLZ}				9.5	13.2	1	15		

* On products compliant to MIL-PRF-38535, this parameter is ensured but not production tested.



SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS235B – OCTOBER 1995 – REVISED AUGUST 1996

switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	SN74AHC373				UNIT	
				$T_A = 25^\circ\text{C}$			MIN		MAX
				MIN	TYP	MAX			
t_{PLH}	D	Q	$C_L = 15\text{ pF}$	7.3	11.4	1	13.5	ns	
t_{PHL}				7.3	11.4	1	13.5		
t_{PLH}	LE	Q	$C_L = 15\text{ pF}$	7	11	1	13	ns	
t_{PHL}				7	11	1	13		
t_{PZH}	\overline{OE}	Q	$C_L = 15\text{ pF}$	7.3	11.4	1	13.5	ns	
t_{PZL}				7.3	11.4	1	13.5		
t_{PHZ}	\overline{OE}	Q	$C_L = 15\text{ pF}$	7	10	1	12	ns	
t_{PLZ}				7	10	1	12		
t_{PLH}	D	Q	$C_L = 50\text{ pF}$	9.8	14.9	1	17	ns	
t_{PHL}				9.8	14.9	1	17		
t_{PLH}	LE	Q	$C_L = 50\text{ pF}$	9.5	14.5	1	16.5	ns	
t_{PHL}				9.5	14.5	1	16.5		
t_{PZH}	\overline{OE}	Q	$C_L = 50\text{ pF}$	9.8	14.9	1	17	ns	
t_{PZL}				9.8	14.9	1	17		
t_{PHZ}	\overline{OE}	Q	$C_L = 50\text{ pF}$	9.5	13.2	1	15	ns	
t_{PLZ}				9.5	13.2	1	15		

switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	SN54AHC373				UNIT	
				$T_A = 25^\circ\text{C}$			MIN		MAX
				MIN	TYP	MAX			
t_{PLH}^*	D	Q	$C_L = 15\text{ pF}$	5	7.2	1	8.5	ns	
t_{PHL}^*				5	7.2	1	8.5		
t_{PLH}^*	LE	Q	$C_L = 15\text{ pF}$	4.9	7.2	1	8.5	ns	
t_{PHL}^*				4.9	7.2	1	8.5		
t_{PZH}^*	\overline{OE}	Q	$C_L = 15\text{ pF}$	5.5	8.1	1	9.5	ns	
t_{PZL}^*				5.5	8.1	1	9.5		
t_{PHZ}^*	\overline{OE}	Q	$C_L = 15\text{ pF}$	5	7.2	1	8.5	ns	
t_{PLZ}^*				5	7.2	1	8.5		
t_{PLH}	D	Q	$C_L = 50\text{ pF}$	6.5	9.2	1	10.5	ns	
t_{PHL}				6.5	9.2	1	10.5		
t_{PLH}	LE	Q	$C_L = 50\text{ pF}$	6.4	9.2	1	10.5	ns	
t_{PHL}				6.4	9.2	1	10.5		
t_{PZH}	\overline{OE}	Q	$C_L = 50\text{ pF}$	7	10.1	1	11.5	ns	
t_{PZL}				7	10.1	1	11.5		
t_{PHZ}	\overline{OE}	Q	$C_L = 50\text{ pF}$	6.5	9.2	1	10.5	ns	
t_{PLZ}				6.5	9.2	1	10.5		

* On products compliant to MIL-PRF-38535, this parameter is ensured but not production tested.



SN54AHC373, SN74AHC373
OCTAL TRANSPARENT D-TYPE LATCHES
WITH 3-STATE OUTPUTS

SCLS235B – OCTOBER 1995 – REVISED AUGUST 1996

switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	SN74AHC373				UNIT	
				$T_A = 25^\circ\text{C}$			MIN		MAX
				MIN	TYP	MAX			
t_{PLH}	D	Q	$C_L = 15\text{ pF}$	5	7.2	1	8.5	ns	
t_{PHL}				5	7.2	1	8.5		
t_{PLH}	LE	Q	$C_L = 15\text{ pF}$	4.9	7.2	1	8.5	ns	
t_{PHL}				4.9	7.2	1	8.5		
t_{PZH}	\overline{OE}	Q	$C_L = 15\text{ pF}$	5.5	8.1	1	9.5	ns	
t_{PZL}				5.5	8.1	1	9.5		
t_{PHZ}	\overline{OE}	Q	$C_L = 15\text{ pF}$	5	7.2	1	8.5	ns	
t_{PLZ}				5	7.2	1	8.5		
t_{PLH}	D	Q	$C_L = 50\text{ pF}$	6.5	9.2	1	10.5	ns	
t_{PHL}				6.5	9.2	1	10.5		
t_{PLH}	LE	Q	$C_L = 50\text{ pF}$	6.4	9.2	1	10.5	ns	
t_{PHL}				6.4	9.2	1	10.5		
t_{PZH}	\overline{OE}	Q	$C_L = 50\text{ pF}$	7	10.1	1	11.5	ns	
t_{PZL}				7	10.1	1	11.5		
t_{PHZ}	\overline{OE}	Q	$C_L = 50\text{ pF}$	6.5	9.2	1	10.5	ns	
t_{PLZ}				6.5	9.2	1	10.5		

output-skew characteristics, $C_L = 50\text{ pF}$ (see Note 4)

PARAMETER	V_{CC}	SN74AHC373				UNIT
		$T_A = 25^\circ\text{C}$		MIN	MAX	
		MIN	MAX			
$t_{sk(o)}$ Output skew	$3.3\text{ V} \pm 0.3\text{ V}$	1.5			1.5	ns
	$5\text{ V} \pm 0.5\text{ V}$	1			1	

NOTE 4: Characteristics are determined during product characterization and ensured by design.

noise characteristics, $V_{CC} = 5\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (see Note 5)

PARAMETER	SN74AHC373			UNIT
	MIN	TYP	MAX	
$V_{OL(P)}$ Quiet output, maximum dynamic V_{OL}			0.8	V
$V_{OL(V)}$ Quiet output, minimum dynamic V_{OL}			-0.8	V
$V_{OH(V)}$ Quiet output, minimum dynamic V_{OH}	4.1			V
$V_{IH(D)}$ High-level dynamic input voltage	3.5			V
$V_{IL(D)}$ Low-level dynamic input voltage			1.5	V

NOTE 5: Characteristics are determined during product characterization and ensured by design for surface-mount packages only.

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

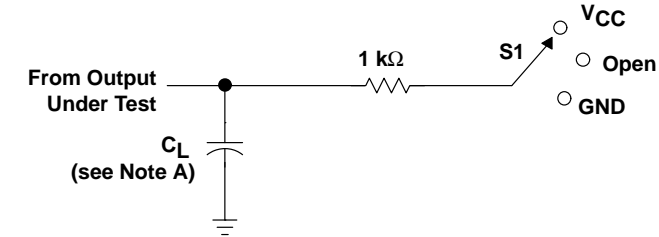
PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance	No load, $f = 1\text{ MHz}$	18	pF



SN54AHC373, SN74AHC373 OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

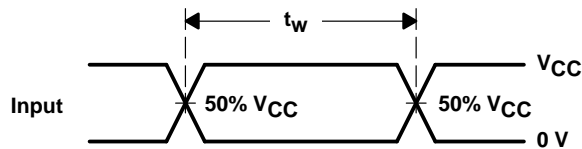
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PARAMETER MEASUREMENT INFORMATION

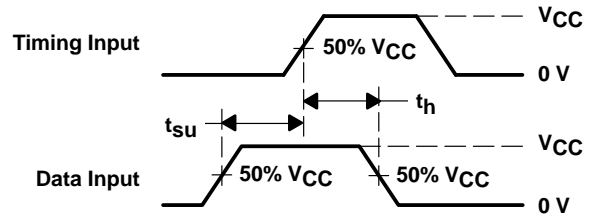


TEST	S1
t _{PLH} /t _{PHL}	Open
t _{PLZ} /t _{PZL}	V _{CC}
t _{PHZ} /t _{PZH}	GND

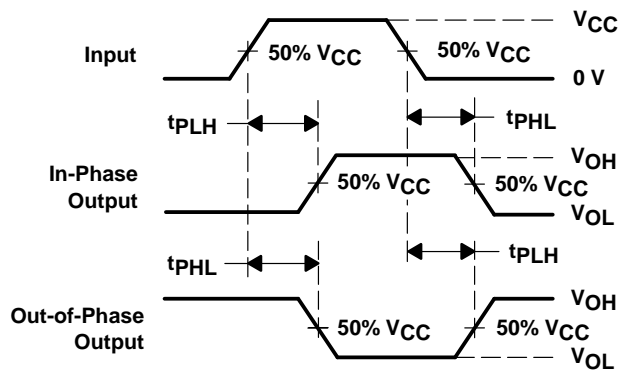
LOAD CIRCUIT



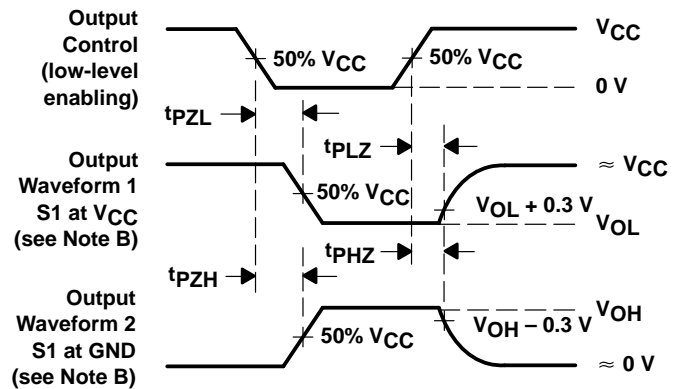
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS DELAY TIMES



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES

- NOTES:
- C_L includes probe and jig 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.
 - All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
 - The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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