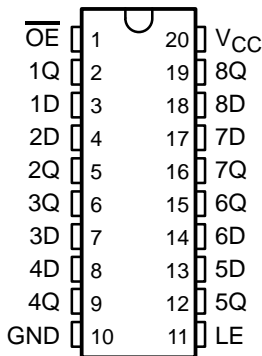


SN54LVC373A, SN74LVC373A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

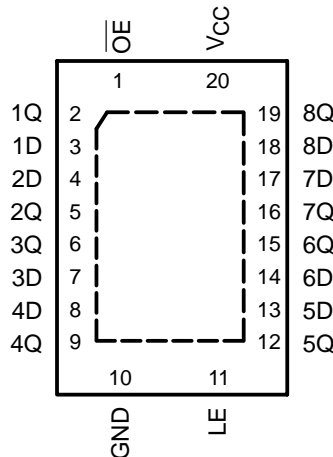
SCAS295P – JANUARY 1993 – REVISED SEPTEMBER 2002

- Operate From 1.65 V to 3.6 V
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 6.8 ns at 3.3 V
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) >2 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- Support Mixed-Mode Signal Operation on All Ports (5-V Input/Output Voltage With 3.3-V V_{CC})
- I_{off} Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

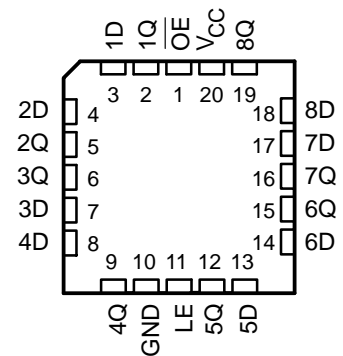
SN54LVC373A . . . J OR W PACKAGE
SN74LVC373A . . . DB, DGV, DW, N,
NS, OR PW PACKAGE
(TOP VIEW)



SN74LVC373A . . . RGY PACKAGE
(TOP VIEW)



SN54LVC373A . . . FK PACKAGE
(TOP VIEW)



description/ordering information

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Tube	SN74LVC373AN	SN74LVC373AN
	QFN – RGY	Tape and reel	SN74LVC373ARGYR	LC373A
	SOIC – DW	Tube	SN74LVC373ADW	LVC373A
		Tape and reel	SN74LVC373ADWR	
	SOP – NS	Tape and reel	SN74LVC373ANSR	LVC373A
	SSOP – DB	Tape and reel	SN74LVC373ADBR	LC373A
	TSSOP – PW	Tape and reel	SN74LVC373APWR	LC373A
	TVSOP – DGV	Tape and reel	SN74LVC373ADGVR	LC373A
VFBGA – GQN	Tape and reel	SN74LVC373AGQNR	LC373A	
-55°C to 125°C	CDIP – J	Tube	SNJ54LVC373AJ	SNJ54LVC373AJ
	CFP – W	Tube	SNJ54LVC373AW	SNJ54LVC373AW
	LCCC – FK	Tube	SNJ54LVC373AFK	SNJ54LVC373AFK

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



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 **TEXAS
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SN54LVC373A, SN74LVC373A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCAS295P – JANUARY 1993 – REVISED SEPTEMBER 2002

description/ordering information (continued)

The SN54LVC373A octal transparent D-type latch is designed for 2.7-V to 3.6-V V_{CC} operation, and the SN74LVC373A octal transparent D-type latch is designed for 1.65-V to 3.6-V V_{CC} operation.

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 logic levels set up at the D inputs.

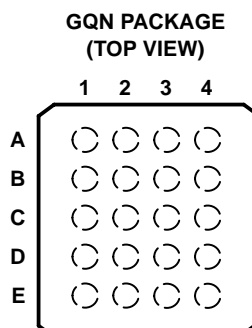
A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or the high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased 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 in the high-impedance state.

These devices are fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of these devices as translators in a mixed 3.3-V/5-V system environment.



terminal assignments

	1	2	3	4
A	1Q	\overline{OE}	V_{CC}	8Q
B	2D	7D	1D	8D
C	3Q	2Q	6Q	7Q
D	4D	5D	3D	6D
E	GND	4Q	LE	5Q

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

SN54LVC373A, SN74LVC373A
OCTAL TRANSPARENT D-TYPE LATCHES
WITH 3-STATE OUTPUTS

SCAS295P – JANUARY 1993 – REVISED SEPTEMBER 2002

recommended operating conditions (see Note 5)

		SN54LVC373A		SN74LVC373A		UNIT
		MIN	MAX	MIN	MAX	
V _{CC}	Supply voltage	Operating		2	3.6	V
		Data retention only		1.5	1.5	
V _{IH}	High-level input voltage	V _{CC} = 1.65 V to 1.95 V		0.65 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V		1.7		
		V _{CC} = 2.7 V to 3.6 V		2	2	
V _{IL}	Low-level input voltage	V _{CC} = 1.65 V to 1.95 V		0.35 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V		0.7		
		V _{CC} = 2.7 V to 3.6 V		0.8	0.8	
V _I	Input voltage	0	5.5	0	5.5	V
V _O	Output voltage	High or low state		0	V _{CC}	V
		3-state		0	5.5	
I _{OH}	High-level output current	V _{CC} = 1.65 V		-4		mA
		V _{CC} = 2.3 V		-8		
		V _{CC} = 2.7 V		-12	-12	
		V _{CC} = 3 V		-24	-24	
I _{OL}	Low-level output current	V _{CC} = 1.65 V		4		mA
		V _{CC} = 2.3 V		8		
		V _{CC} = 2.7 V		12	12	
		V _{CC} = 3 V		24	24	
Δt/Δv	Input transition rise or fall rate	10		10		ns/V
T _A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 5: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.



SN54LVC373A, SN74LVC373A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCAS295P – JANUARY 1993 – REVISED SEPTEMBER 2002

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

PARAMETER	TEST CONDITIONS	V _{CC}	SN54LVC373A			SN74LVC373A			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V _{OH}	I _{OH} = -100 μA	1.65 V to 3.6 V				V _{CC} -0.2			V
		2.7 V to 3.6 V	V _{CC} -0.2						
	I _{OH} = -4 mA	1.65 V			1.2				
	I _{OH} = -8 mA	2.3 V			1.7				
	I _{OH} = -12 mA	2.7 V		2.2	2.2				
		3 V		2.4	2.4				
I _{OH} = -24 mA	3 V		2.2	2.2					
V _{OL}	I _{OL} = 100 μA	1.65 V to 3.6 V						0.2	V
		2.7 V to 3.6 V			0.2				
	I _{OL} = 4 mA	1.65 V					0.45		
	I _{OL} = 8 mA	2.3 V					0.7		
	I _{OL} = 12 mA	2.7 V		0.4			0.4		
	I _{OL} = 24 mA	3 V		0.55			0.55		
I _I	V _I = 0 to 5.5 V	3.6 V			±5		±5	μA	
I _{off}	V _I or V _O = 5.5 V	0					±10	μA	
I _{OZ}	V _O = 0 to 5.5 V	3.6 V			±15		±10	μA	
I _{CC}	V _I = V _{CC} or GND	3.6 V	I _O = 0		10		10	μA	
	3.6 V ≤ V _I ≤ 5.5 V‡				10		10		
ΔI _{CC}	One input at V _{CC} - 0.6 V, Other inputs at V _{CC} or GND	2.7 V to 3.6 V			500		500	μA	
C _i	V _I = V _{CC} or GND	3.3 V		4	12		4	pF	
C _o	V _O = V _{CC} or GND	3.3 V		5.5	12		5.5	pF	

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

‡ This applies in the disabled state only.

timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

		SN54LVC373A				UNIT
		V _{CC} = 2.7 V		V _{CC} = 3.3 V ± 0.3 V		
		MIN	MAX	MIN	MAX	
t _w	Pulse duration, LE high	3.3		3.3		ns
t _{su}	Setup time, data before LE↓	2		2		ns
t _h	Hold time, data after LE↓	2		2		ns



SN54LVC373A, SN74LVC373A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCAS295P – JANUARY 1993 – REVISED SEPTEMBER 2002

timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

		SN74LVC373A								UNIT
		V _{CC} = 1.8 V ± 0.15 V		V _{CC} = 2.5 V ± 0.2 V		V _{CC} = 2.7 V		V _{CC} = 3.3 V ± 0.3 V		
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration, LE high	†		†		3.3		3.3		ns
t _{su}	Setup time, data before LE↓	†		†		2		2		ns
t _h	Hold time, data after LE↓	†		†		1.5		1.5		ns

† This information was not available at the time of publication.

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54LVC373A				UNIT
			V _{CC} = 2.7 V		V _{CC} = 3.3 V ± 0.3 V		
			MIN	MAX	MIN	MAX	
t _{pd}	D	Q	8.5		1	7.5	ns
	LE		9.5		1	8.5	
t _{en}	\overline{OE}	Q	8.7		1	7.7	ns
t _{dis}	\overline{OE}	Q	8		0.5	7	ns

switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74LVC373A								UNIT
			V _{CC} = 1.8 V ± 0.15 V		V _{CC} = 2.5 V ± 0.2 V		V _{CC} = 2.7 V		V _{CC} = 3.3 V ± 0.3 V		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t _{pd}	D	Q	†	†	†	†	7.8		1.5	6.8	ns
	LE		†	†	†	†	8.2		2	7.6	
t _{en}	\overline{OE}	Q	†	†	†	†	8.7		1.5	7.7	ns
t _{dis}	\overline{OE}	Q	†	†	†	†	7.6		1.5	7	ns
t _{sk(o)}										1	ns

† This information was not available at the time of publication.

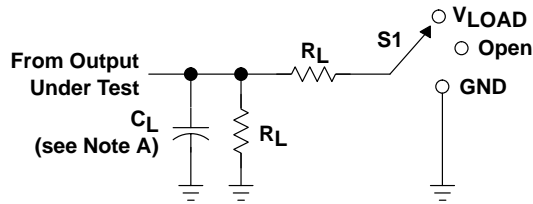
operating characteristics, T_A = 25°C

PARAMETER		TEST CONDITIONS	V _{CC} = 1.8 V	V _{CC} = 2.5 V	V _{CC} = 3.3 V	UNIT
			TYP	TYP	TYP	
C _{pd}	Power dissipation capacitance per latch	Outputs enabled	†	†	46	pF
	Outputs disabled		†	†	3	

† This information was not available at the time of publication.



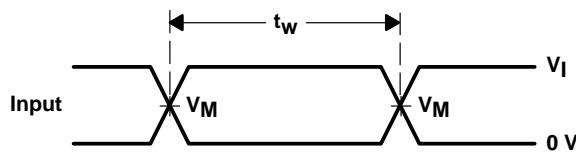
PARAMETER MEASUREMENT INFORMATION



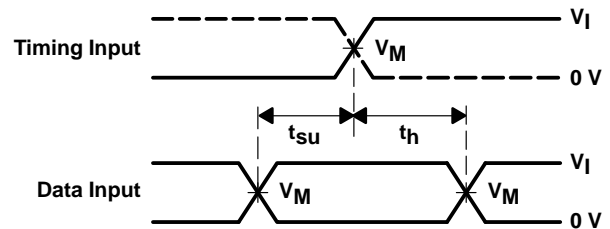
LOAD CIRCUIT

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

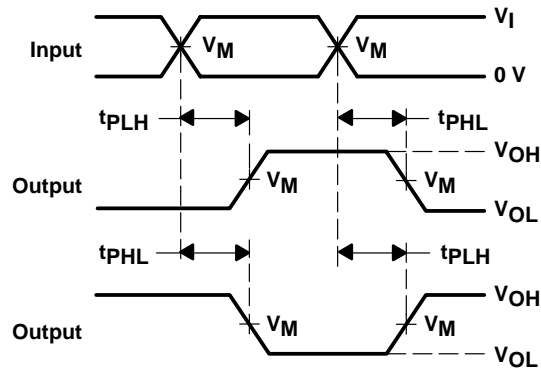
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
$1.8\text{ V} \pm 0.15\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k Ω	0.15 V
$2.5\text{ V} \pm 0.2\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 Ω	0.15 V
2.7 V	2.7 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	50 pF	500 Ω	0.3 V
$3.3\text{ V} \pm 0.3\text{ V}$	2.7 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	50 pF	500 Ω	0.3 V



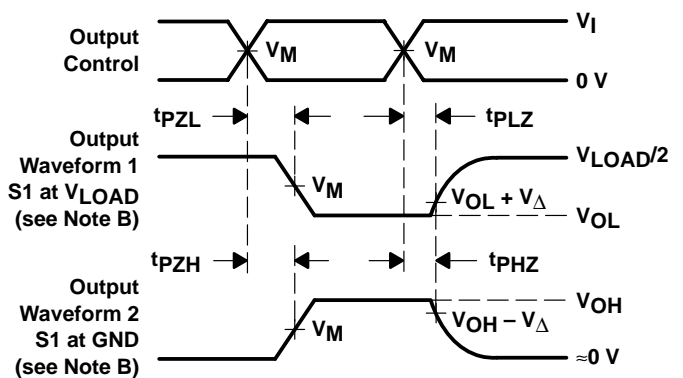
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

- NOTES: A. C_L includes probe and jig 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. All input pulses are supplied by generators having the following characteristics: PRR $\leq 10\text{ MHz}$, $Z_O = 50\ \Omega$.
 D. The outputs are measured one at a time with one 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} .
 H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

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Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265