

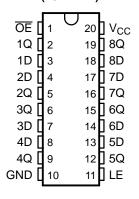
SN74LV373AT



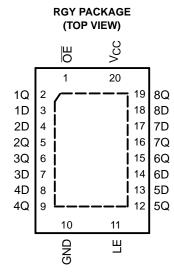
FEATURES

- Inputs Are TTL-Voltage Compatible
- 4.5-V to 5.5-V V_{CC} Operation
- Typical t_{pd} of 5.1 ns at 5 V
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) >2.3 V at V_{CC} = 5 V, T_A = 25°C
- **Supports Mixed-Mode Voltage Operation on All Ports**

DB, DW, NS, OR PW PACKAGE (TOP VIEW)



- 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)



DESCRIPTION/ORDERING INFORMATION

The SN74LV373AT is an octal transparent D-type latch. 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.

ORDERING INFORMATION

T _A	PACKA	GE ⁽¹⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	QFN – RGY	Reel of 1000	SN74LV373ATRGYR	VV373
	SOIC - DW	Tube of 25	SN74LV373ATDW	LV373AT
	SOIC - DW	Reel of 2500	SN74LV373ATDWR	LV3/3AT
–40°C to 125°C	SOP - NS	Reel of 2000	SN74LV373ATNSR	74LV373AT
-40 C to 125 C	SSOP - DB	Reel of 2000	SN74LV373ATDBR	LV373AT
		Tube of 70	SN74LV373ATPW	
	TSSOP - PW	Reel of 2000	SN74LV373ATPWR	LV373AT
		Reel of 250	SN74LV373ATPWT	

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



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SCES630B-JULY 2005-REVISED AUGUST 2005



DESCRIPTION/ORDERING INFORMATION (CONTINUED)

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 need for interface or pullup components.

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.

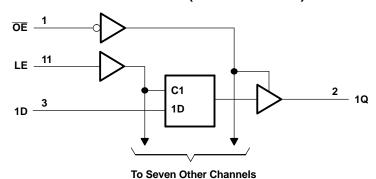
To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

FUNCTION TABLE (EACH LATCH)

	INPUTS		OUTPUT						
ŌĒ	ŌĒ LE D								
1	Н	Н	Н						
L	Н	L	L						
L	L	X	Q_0						
Н	X	Χ	Z						

LOGIC DIAGRAM (POSITIVE LOGIC)





SCES630B-JULY 2005-REVISED AUGUST 2005

Absolute Maximum Ratings⁽¹⁾

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		-0.5	7	V
VI	Input voltage range ⁽²⁾		-0.5	7	V
Vo	Voltage range applied to any output in th	e high-impedance or power-off state ⁽²⁾	-0.5	7	V
Vo	Output voltage range ⁽²⁾⁽³⁾		-0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current	V ₁ < 0		-20	mA
I _{OK}	Output clamp current	$V_O < 0$ or $V_O > V_{CC}$		±50	mA
Io	Continuous output current	$V_O < 0 \text{ or } V_O > V_{CC}$ $V_O = 0 \text{ to } V_{CC}$		±35	mA
	Continuous current through V _{CC} or GND			±70	mA
		DB package ⁽⁴⁾		70	
		DW package ⁽⁴⁾		58	
θ_{JA}	Package thermal impedance	NS package (4)		60	°C/W
		PW package ⁽⁴⁾		83	
		RGY package ⁽⁵⁾		37	
T _{stg}	Storage temperature range		-65	150	°C

- (1) 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.
- (2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- 3) This value is limited to 5.5 V maximum.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.
- (5) The package thermal impedance is calculated in accordance with JESD 51-5.

Recommended Operating Conditions⁽¹⁾

			MIN	MAX	UNIT
V_{CC}	Supply voltage		4.5	5.5	V
V_{IH}	High-level input voltage	V _{CC} = 4.5 V to 5.5 V	2		V
V_{IL}	Low-level input voltage	V _{CC} = 4.5 V to 5.5 V		0.8	V
V_{I}	Input voltage		0	5.5	V
\/	Output voltage	High or low state	0	V_{CC}	V
Vo	Output voltage	3-state	0	5.5	V
I _{OH}	High-level output current	V _{CC} = 4.5 V to 5.5 V		-16	mA
I _{OL}	Low-level output current	V _{CC} = 4.5 V to 5.5 V		16	mA
Δt/Δν	Input transition rise or fall rate	V _{CC} = 4.5 V to 5.5 V		20	ns/V
T _A	Operating free-air temperature		-40	125	°C

⁽¹⁾ 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.

SN74LV373AT OCTAL TRANSPARENT D-TYPE LATCH WITH 3-STATE OUTPUTS

SCES630B-JULY 2005-REVISED AUGUST 2005



Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V _{cc}	Т	_A = 25°	С	T _A = -		T _A = -		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V	$I_{OH} = -50 \mu A$	4.5 V	4.4	4.5		4.4		4.4		V
V _{OH}	I _{OH} = -16 mA	4.5 V	3.8			3.8		3.8		V
V/	I _{OL} = 100 μA	4.5 V		0	0.1		0.1		0.1	V
V _{OL}	I _{OL} = 16 mA	4.5 V			0.55		0.55		0.55	V
I _I	$V_I = 5.5$ or GND	0 to 5.5 V			±0.1		±1		±1	μΑ
I _{OZ}	$V_O = V_{CC}$ or GND	5.5 V			±0.25		±2.5		±2.5	μΑ
I _{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			2		20		20	μΑ
ΔI _{CC} ⁽¹⁾	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			40		50		50	μΑ
I _{off}	V_I or $V_O = 0$ to 5.5 V	0			0.5		5		5	μΑ
C _i	$V_I = V_{CC}$ or GND			4	10		10		10	pF
C _o	V _O = V _{CC} or GND			7.5						pF

⁽¹⁾ This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

Timing Requirements

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

			T _A = 25°C			40°C 5°C	T _A = -	UNIT	
			MIN	MAX	MIN	MAX	MIN	MAX	
t _w	Pulse duration, LE high		6.5		8.5		8.5		ns
t _{su}	Setup time, data before LE↓	High or low	1.5		1.5		1.5		ns
t _h	Hold time, data after LE \downarrow	High or low	3.5		3.5		3.5		ns

Switching Characteristics

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

PARAMETER	FROM (INPUT)	TO (OUTBUT)	LOAD CAPACITANCE	T _A = 25°C		T _A = -40°C to 85°C		T _A = -	UNIT		
	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	MIN	MAX	MIN	MAX	
4	D	Q		2.9	5.1	8.5	1	9.5	1	10	
t _{pd}	LE	Q	C - 15 pF	3.5	7.7	12.3	1	13.5	1	14	ns
t _{en}	ŌĒ	Q	$C_L = 15 pF$	3.5	6.3	10.9	1	12.5	1	13	115
t _{dis}	ŌĒ	Q		1.7	3.3	7.2	1	8.5	1	9	
4	D	Q		4.4	5.9	9.5	1	10.5	1	11	
t _{pd}	LE	Q		4.8	8.5	13.3	1	14.5	1	15	
t _{en}	ŌĒ	Q	$C_{L} = 50 \text{ pF}$	5	7.1	11.9	1	13.5	1	14	ns
t _{dis}	ŌĒ	Q		3	8.8	11.2	1	12	1	12.5	
t _{sk(o)}	·							1		1	





SCES630B-JULY 2005-REVISED AUGUST 2005

Noise Characteristics⁽¹⁾

 V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C

	PARAMETER	MIN	TYP	MAX	UNIT
$V_{OL(P)}$	Quiet output, maximum dynamic V _{OL}		0.8	1	V
V _{OL(V)}	Quiet output, minimum dynamic V _{OL}		-0.6	-0.8	V
V _{OH(V)}	Quiet output, minimum dynamic V _{OH}		2.9		V
V _{IH(D)I}	High-level dymanic input voltage	2.31			V
$V_{IL(D)}$	Low-level dynamic input voltage			0.99	V

⁽¹⁾ Characteristics are for surface-mount packages only.

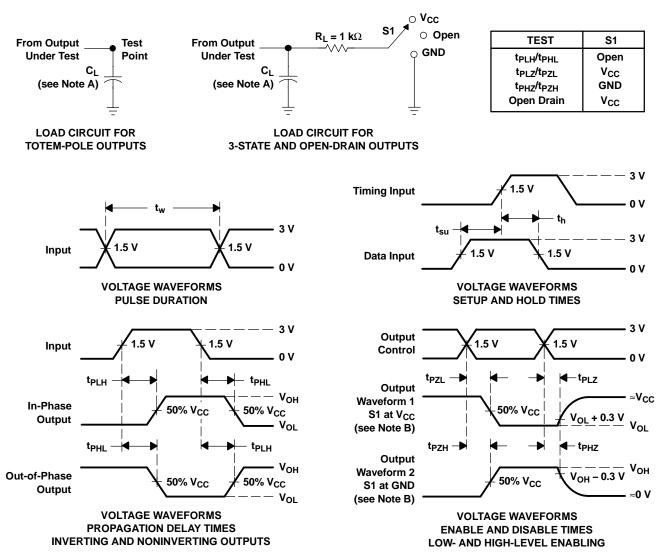
Operating Characteristics

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

	PARAMETE	TEST CO	ONDITIONS	TYP	UNIT	
C_{pd}	Power dissipation capacitance	Outputs enabled	$C_L = 50 \text{ pF},$	f = 10 MHz	15.5	pF



PARAMETER MEASUREMENT INFORMATION



- 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 1 MHz, $Z_O = 50~\Omega$, $t_f \leq$ 3 ns, $t_f \leq$ 3 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_{PHL} and t_{PLH} are the same as t_{pd}.
 - H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuits and Voltage Waveforms



PACKAGE OPTION ADDENDUM

10-Dec-2020

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
							(6)				
SN74LV373ATDWR	ACTIVE	SOIC	DW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV373AT	Samples
SN74LV373ATNSR	ACTIVE	SO	NS	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	74LV373AT	Samples
SN74LV373ATPWR	ACTIVE	TSSOP	PW	20	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 125	LV373AT	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.

OBSOLETE: 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 (CI) 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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PACKAGE OPTION ADDENDUM

10-Dec-2020

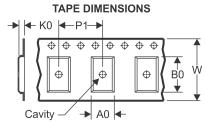
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PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





Α0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

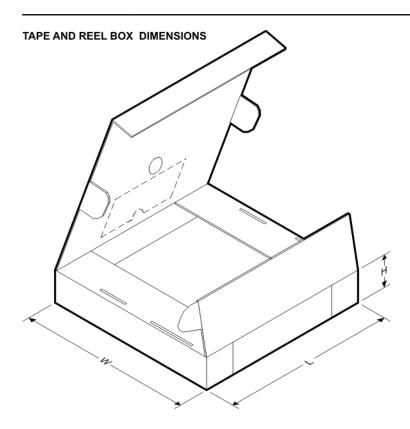
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LV373ATDWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74LV373ATNSR	SO	NS	20	2000	330.0	24.4	8.4	13.0	2.5	12.0	24.0	Q1
SN74LV373ATPWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.0	1.4	8.0	16.0	Q1

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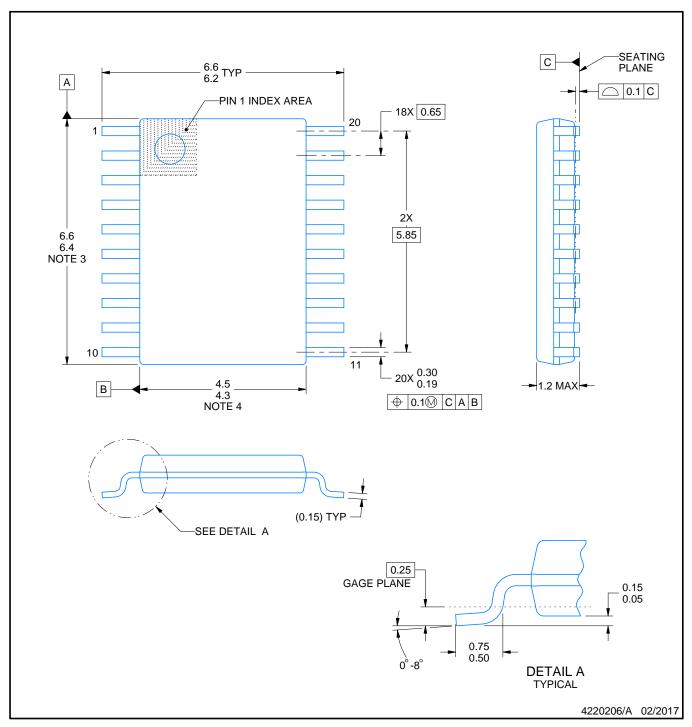


*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LV373ATDWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74LV373ATNSR	SO	NS	20	2000	367.0	367.0	45.0
SN74LV373ATPWR	TSSOP	PW	20	2000	853.0	449.0	35.0



SMALL OUTLINE PACKAGE



- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- 5. Reference JEDEC registration MO-153.



SMALL OUTLINE PACKAGE



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.



SMALL OUTLINE PACKAGE



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.



PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
 C. Publication IPC-7351 is recommended for alternate design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



- 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.





SOIC



- 1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
- 5. Reference JEDEC registration MS-013.



SOIC



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.



SOIC



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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