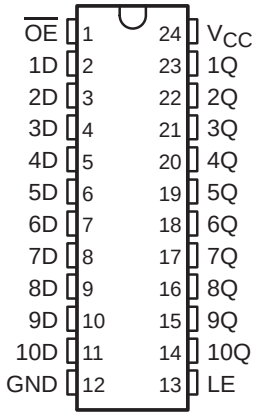
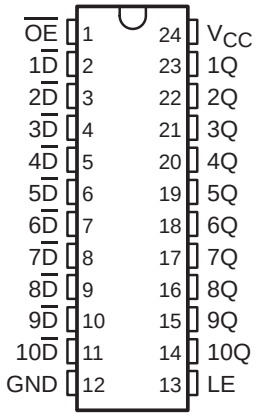
- **3-State Buffer-Type Outputs Drive Bus Lines Directly**
- **Bus-Structured Pinout**
- **Provide Extra Bus-Driving Latches Necessary for Wider Address/Data Paths or Buses With Parity**
- **Buffered Control Inputs to Reduce dc Loading Effects**
- **Power-Up High-Impedance State**
- **Package Options Include Plastic Small-Outline (DW) Packages and Standard Plastic (NT) 300-mil DIPs**

SN74ALS841, SN74AS841A . . . DW OR NT PACKAGE
(TOP VIEW)



SN74ALS842 . . . DW OR NT PACKAGE
(TOP VIEW)



description

These 10-bit latches feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The ten latches are transparent D-type latches. The SN74ALS841 and SN74AS841A have noninverting data (D) inputs. The SN74ALS842 has inverting $\overline{D}$ inputs.

A buffered output-enable ($\overline{OE}$) input places the ten outputs in either a normal logic state (high or low logic levels) or a 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 operation of the latches. Previously stored data can be retained or new data can be entered while the outputs are off.

The SN74ALS841, SN74AS841A, and SN74ALS842 are characterized for operation from 0°C to 70°C.

Function Tables

SN74ALS841, SN74AS841A

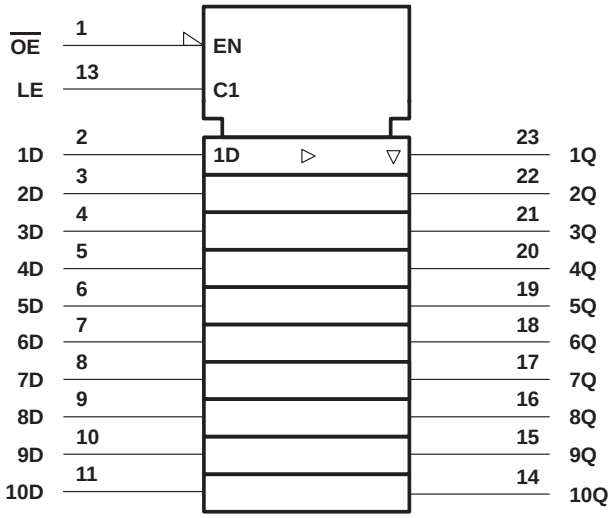
INPUTS			OUTPUT
$\overline{OE}$	LE	D	Q
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

SN74ALS842

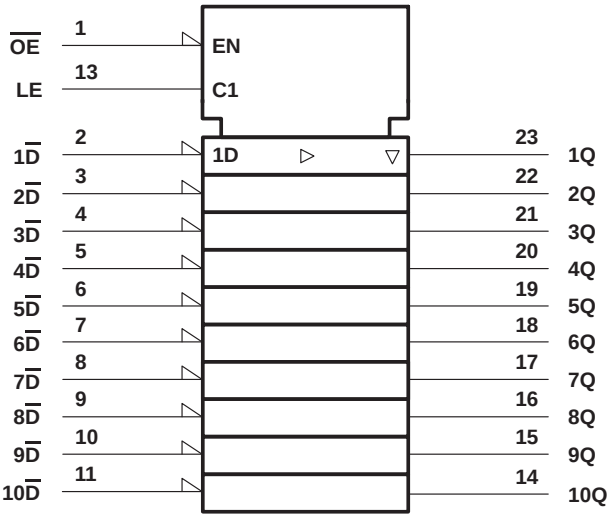
INPUTS			OUTPUT
$\overline{OE}$	LE	$\overline{D}$	Q
L	H	H	L
L	H	L	H
L	L	X	Q_0
H	X	X	Z

logic symbols†

SN74ALS841, SN74AS841A



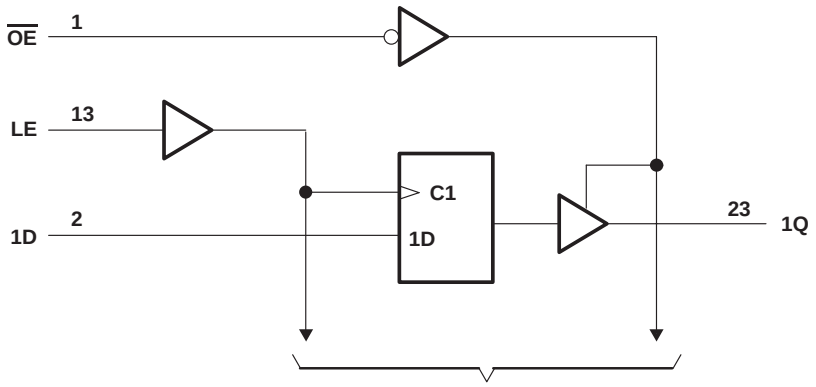
SN74ALS842



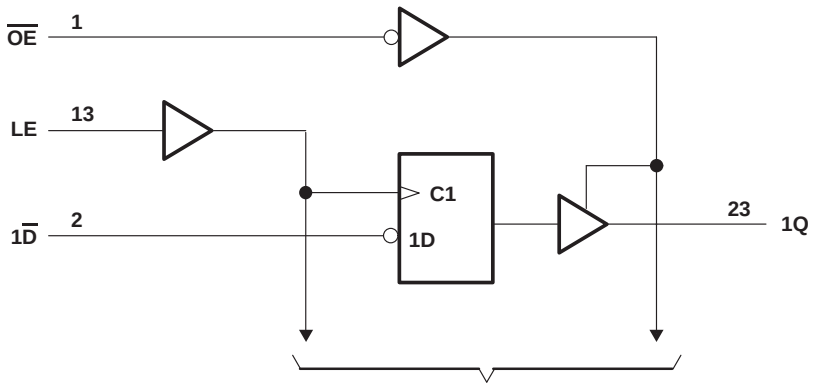
† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagrams (positive logic)

SN74ALS841, SN74AS841A



SN74ALS842



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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage, V_I . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range, T_A: SN74ALS841, SN74ALS842 . . . . . 0°C to 70°C
Storage temperature range . . . . . –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.

recommended operating conditions

		SN74ALS841 SN74ALS842			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{OH}	High-level output current			–2.6	mA
I_{OL}	Low-level output current			24	mA
t_w	Pulse duration, LE high	20			ns
t_{su}	Setup time, data before LE↓	10			ns
t_h	Hold time, data after LE↓	5			ns
T_A	Operating free-air temperature	0		70	°C

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

PARAMETER		TEST CONDITIONS		SN74ALS841 SN74ALS842			UNIT
				MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA			–1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = –0.4 mA	V_{CC} –2			V
		V_{CC} = 4.5 V,	I_{OH} = –2.6 mA	2.4	3.2		
V_{OL}		V_{CC} = 4.5 V	I_{OL} = 12 mA		0.25	0.4	V
			I_{OL} = 24 mA		0.35	0.5	
I_{OZH}		V_{CC} = 5.5 V,	V_O = 2.7 V			20	µA
I_{OZL}		V_{CC} = 5.5 V,	V_O = 0.4 V			–20	µA
I_I		V_{CC} = 5.5 V,	V_I = 7 V			0.1	mA
I_{IH}		V_{CC} = 5.5 V,	V_I = 2.7 V			20	µA
I_{IL}		V_{CC} = 5.5 V,	V_I = 0.4 V			–0.1	mA
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	–30		–112	mA
I_{CC}	SN74ALS841	V_{CC} = 5.5 V	Outputs high		19	30	mA
			Outputs low		38	62	
			Outputs disabled		23	40	
	SN74ALS842	V_{CC} = 5.5 V	Outputs high		20	35	
			Outputs low		48	74	
			Outputs disabled		27	44	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†		UNIT
			SN74ALS841		
			MIN	MAX	
t_{PLH}	D	Q	2	13	ns
t_{PHL}			2	13	
t_{PLH}	LE	Q	7	21	ns
t_{PHL}			8	26	
t_{PZH}	$\overline{OE}$	Q	2	12	ns
t_{PZL}			2	12	
t_{PHZ}	$\overline{OE}$	Q	2	10	ns
t_{PLZ}			2	12	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†		UNIT
			SN74ALS842		
			MIN	MAX	
t_{PLH}	$\overline{D}$	Q	4	18	ns
t_{PHL}			3	13	
t_{PLH}	LE	Q	8	27	ns
t_{PHL}			6	20	
t_{PZH}	$\overline{OE}$	Q	2	12	ns
t_{PZL}			2	12	
t_{PHZ}	$\overline{OE}$	Q	1	10	ns
t_{PLZ}			2	12	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage, V_I . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range, T_A: SN74AS841A . . . . . 0°C to 70°C
Storage temperature range . . . . . –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.

recommended operating conditions

		SN74AS841A			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{OH}	High-level output current			–24	mA
I_{OL}	Low-level output current			48	mA
t_w	Pulse duration, LE high	4			ns
t_{su}	Setup time, data before LE↓	2.5			ns
t_h	Hold time, data after LE↓	2.5			ns
T_A	Operating free-air temperature	0		70	°C

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

PARAMETER	TEST CONDITIONS		SN74AS841A			UNIT
			MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = –18 mA			–1.2	V
V_{OH}	V_{CC} = 4.5 V to 5.5 V,	I_{OH} = –2 mA	V_{CC} –2			V
	V_{CC} = 4.5 V	I_{OH} = –15 mA	2.4	3.2		
		I_{OH} = –24 mA	2			
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 48 mA		0.35	0.5	V
I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V			50	µA
I_{OZL}	V_{CC} = 5.5 V,	V_O = 0.4 V			–50	µA
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V			–0.5	mA
I_O‡	V_{CC} = 5.5 V,	V_O = 2.25 V	–30		–112	mA
I_{CC}	V_{CC} = 5.5 V	Outputs high		36	60	mA
		Outputs low		58	94	
		Outputs disabled		56	93	

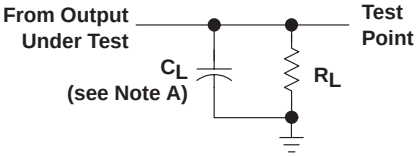
† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

switching characteristics (see Figure 1)

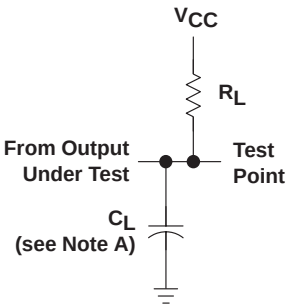
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†		UNIT
			SN74AS841A		
			MIN	MAX	
t_{PLH}	D	Q	1	6.5	ns
t_{PHL}			1	10.5	
t_{PLH}	LE	Q	2	12	ns
t_{PHL}			2	12	
t_{PZH}	$\overline{OE}$	Q	2	14	ns
t_{PZL}			2	16	
t_{PHZ}	$\overline{OE}$	Q	1	8	ns
t_{PLZ}			1	8	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

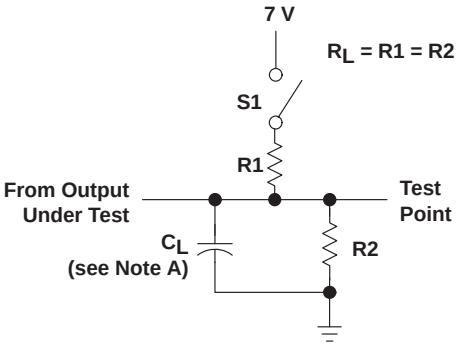
PARAMETER MEASUREMENT INFORMATION
SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



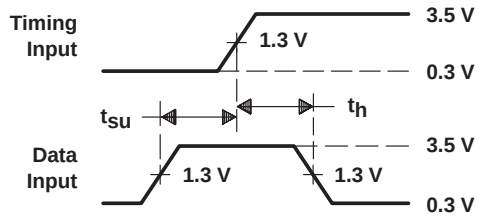
LOAD CIRCUIT FOR
BI-STATE
TOTEM-POLE OUTPUTS



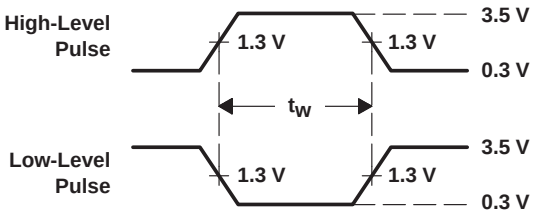
LOAD CIRCUIT
FOR OPEN-COLLECTOR OUTPUTS



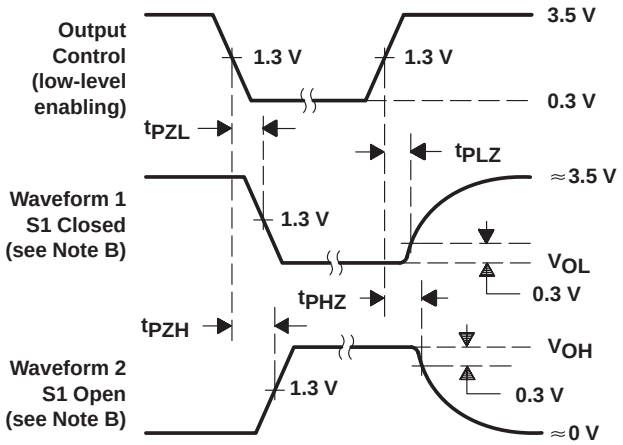
LOAD CIRCUIT
FOR 3-STATE OUTPUTS



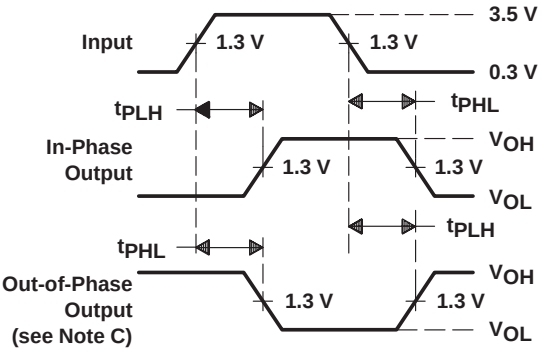
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PULSE DURATIONS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES

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. When measuring propagation delay items of 3-state outputs, switch S1 is open.
D. All input pulses have the following characteristics: PRR ≤ 1 MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.