SDAS079A – D2661, DECEMBER 1982 – REVISED MAY 1986

- **3-State Buffer-Type Outputs Drive Bus Lines Directly**
- **Bus-Structured Pinout**
- **'ALS873B is Alternative Version With Noninverting Outputs**
- **Package Options Include Plastic Small Outline Packages, Both Plastic and Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**
- **Dependable Texas Instruments Quality and Reliability**

description

These dual 4-bit registers feature 3-state outputs designed specifically for bus driving. This makes these devices particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The dual 4-bit latches are transparent D-type. When the latch enable input (1C or 2C) is high, the $\overline{Q}$ outputs will follow the data (D) inputs in inverted form, according to the function table. When the latch enable input is taken low, the outputs will be latched. When $\overline{PRE}$ goes low, the $\overline{Q}$ outputs go low independently of the clock. The outputs are in a high-impedance state when $\overline{OC}$ (output control) is at a high logic level.

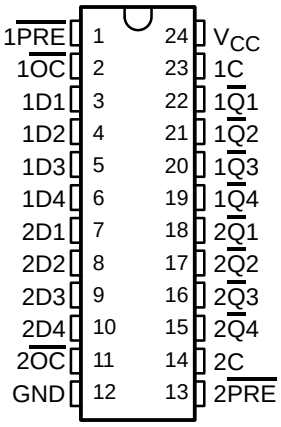
The SN54ALS880A and SN54AS880 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS880A and SN74AS880 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(each latch)

INPUTS				OUTPUT
$\overline{OC}$	$\overline{PRE}$	C	D	$\overline{Q}$
L	L	X	X	L
L	H	H	H	L
L	H	H	L	H
L	H	L	X	$\overline{Q}_0$
H	X	X	X	Z

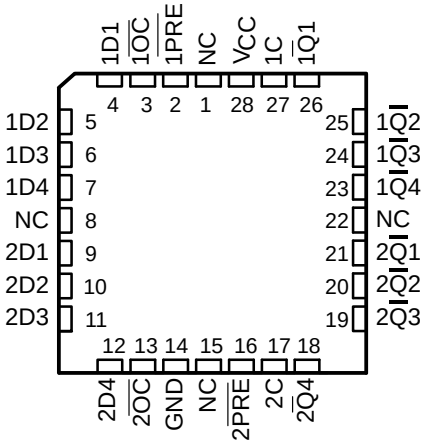
SN54ALS880A, SN54AS880 . . . JT PACKAGE
SN74ALS880A, SN74AS880 . . . DW OR NT PACKAGE

(TOP VIEW)



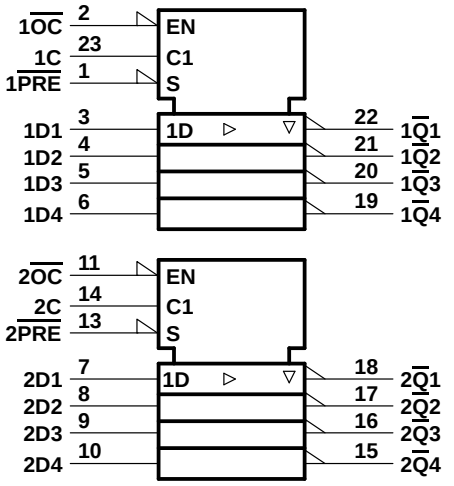
SN54ALS880A, SN54AS880 . . . JT PACKAGE
SN74ALS880A, SN74AS880 . . . DW OR NT PACKAGE

(TOP VIEW)



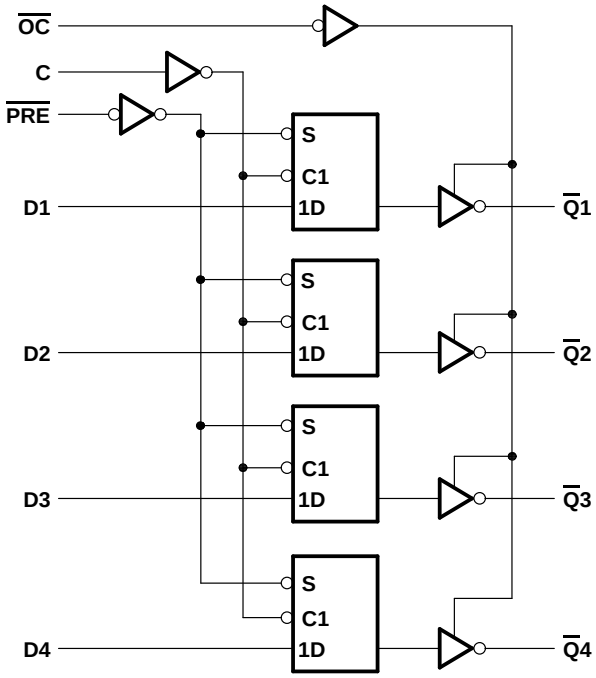
NC – No internal connection

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, JT, and NT packages.

logic diagram (each quad latch, positive logic)



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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range: SN54ALS880A, SN54AS880 . . . . . –55°C to 125°C
SN74ALS880A, SN74AS880 . . . . . 0°C to 70°C
Storage temperature range . . . . . –65°C to 150°C

recommended operating conditions

			SN54ALS880A			SN74ALS880A			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage		2			2			V
V_{IL}	Low-level input voltage				0.7			0.8	V
I_{OH}	High-level output current				–1			–2.6	mA
I_{OL}	Low-level output current				12			24	mA
t_w	Pulse duration	$\overline{PRE}$ low	15			15			ns
		C high	15			15			
t_{su}	Setup time, data before C↓		10			10			ns
t_h	Hold time, data after C↓		10			10			ns
T_A	Operating free-air temperature		–55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS		SN54ALS880A			SN74ALS880A			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = –18 mA			–1.2			–1.2	V
V_{OH}	V_{CC} = 4.5 V to 5.5 V,	I_{OH} = –0.4 mA	V_{CC}–2			V_{CC}–2			V
	V_{CC} = 4.5 V,	I_{OH} = –1 mA	2.4	3.3					
	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		0.25	0.4	V
	V_{CC} = 4.5 V,	I_{OL} = 24 mA					0.35	0.5	
I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V			20			20	µA
I_{OZL}	V_{CC} = 5.5 V,	V_O = 0.4 V			–20			–20	µA
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V			–0.2			–0.2	mA
I_O‡	V_{CC} = 5.5 V,	V_O = 2.25 V	–30		–112	–30		–112	mA
I_{CC}	V_{CC} = 5.5 V	Outputs high		14	21		14	21	mA
		Outputs low		19	29		19	29	
		Outputs disabled		20	31		20	31	

† 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 Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			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
			'ALS880A			SN54ALS880A		SN74ALS880A		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	D	$\overline{Q}$		14	19	3	23	3	20	ns
t_{PHL}				9	12	3	15	3	14	
t_{PLH}	C	$\overline{Q}$		17	22	8	31	8	24	ns
t_{PHL}				14	18	8	22	8	21	
t_{PHL}	$\overline{PRE}$	$\overline{Q}$		12	16	6	24	6	21	ns
t_{PZH}	$\overline{OC}$	$\overline{Q}$		12	15	4	21	4	18	ns
t_{PZL}				13	17	4	21	4	18	
t_{PHZ}	$\overline{OC}$	$\overline{Q}$		6	9	2	12	2	10	ns
t_{PLZ}				8	11	3	21	3	17	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

recommended operating conditions

			SN54AS880			SN74AS880			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage		2			2			V
V_{IL}	Low-level input voltage				0.8			0.8	V
I_{OH}	High-level output current				−12			−15	mA
I_{OL}	Low-level output current				32			48	mA
t_w	Pulse duration	$\overline{PRE}$ low	4.5			3.5			ns
		C high	4			2.5			
t_{su}	Setup time, data before C↓		2			2			ns
t_h	Hold time, data after C↓		1			1			ns
T_A	Operating free-air temperature		−55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS		SN54AS880			SN74AS880			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}	V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −2 mA	V_{CC}−2			V_{CC}−2			V
	V_{CC} = 4.5 V,	I_{OH} = −12 mA	2.4	3.2					
	V_{CC} = 4.5 V,	I_{OH} = −15 mA				2.4	3.3		
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 32 mA		0.30	0.5				V
	V_{CC} = 4.5 V,	I_{OL} = 48 mA					0.35	0.5	
I_{OZH}	V_{CC} = 5.5 V,	V_O = 2.7 V			50			50	µA
I_{OZL}	V_{CC} = 5.5 V,	V_O = 0.4 V			−50			−50	µA
I_I	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	µA
I_{IL}	V_{CC} = 5.5 V,	V_I = 0.4 V			−0.5			−0.5	mA
I_O‡	V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	V_{CC} = 5.5 V	Outputs high		73	118		73	118	mA
		Outputs low		76	122		76	122	
		Outputs disabled		86	137		86	137	

† 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 Note 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
			SN54AS880		SN74AS880		
			MIN	MAX	MIN	MAX	
t_{PLH}	D	$\overline{Q}$	4	11	4	9.5	ns
t_{PHL}			4	9	4	8.5	
t_{PLH}	C	$\overline{Q}$	6	14	6	11.5	ns
t_{PHL}			4	10	4	8	
t_{PHL}	$\overline{PRE}$	$\overline{Q}$	4	11.5	4	10	ns
t_{PZH}	$\overline{OC}$	$\overline{Q}$	2	8	2	7.5	ns
t_{PZL}			4	11	4	10	
t_{PHZ}	$\overline{OC}$	$\overline{Q}$	2	8	2	6.5	ns
t_{PLZ}			2	9	2	8	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

IMPORTANT NOTICE

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software 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, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

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

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI 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.