

SN54ALS573B, SN54ALS580A, SN54AS573, SN54AS580 SN74ALS573B, SN74ALS580A, SN74AS573, SN74AS580 OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

D2661, DECEMBER 1982 — REVISED MAY 1986

- 3-State Buffer-Type Outputs Drive Bus-Lines Directly
- Bus-Structured Pinout
- Choice of True or Inverting Logic
 - 'ALS573B, 'AS573 True Outputs
 - 'ALS580A, 'AS580 Inverting Outputs
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

These 8-bit latches feature three-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.

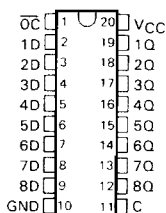
The eight latches are transparent D-type latches. While the enable (C) is high the outputs (Q or \bar{Q}) will respond to the data (D) inputs. When the enable is taken low the outputs will be latched to retain the data that was set up.

A buffered output-control input can be used to place the eight 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 the bus lines in a bus-organized system without need for interface or pull-up components.

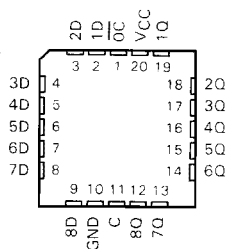
The output control (\bar{OC}) does not affect the internal operation of the latches. Old data can be retained or new data can be entered while the outputs are at high impedance.

The SN54ALS' and SN54AS' devices are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS' and SN74AS' devices are characterized for operation from 0°C to 70°C .

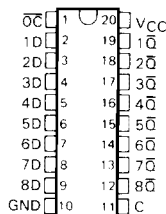
SN54ALS573B, SN54AS573 . . . J PACKAGE
SN74ALS573B, SN74AS573 . . . DW OR N PACKAGE
(TOP VIEW)



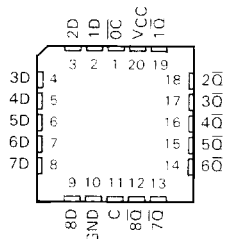
SN54ALS573B, SN54AS573 . . . FK PACKAGE
(TOP VIEW)



SN54ALS580A, SN54AS580 . . . J PACKAGE
SN74ALS580A, SN74AS580 . . . DW OR N PACKAGE
(TOP VIEW)



SN54ALS580A, SN54AS580 . . . FK PACKAGE
(TOP VIEW)



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**SN54ALS573B, SN54ALS580A, SN54AS573, SN54AS580
 SN74ALS573B, SN74ALS580A, SN74AS573, SN74AS580
 OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS**

FUNCTION TABLES

'ALS573B, 'AS573
(EACH LATCH)

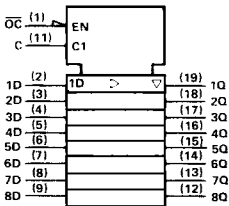
INPUTS			OUTPUT Q
ENABLE	C	D	
\overline{OC}	C	D	
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

'ALS580A, 'AS580
(EACH LATCH)

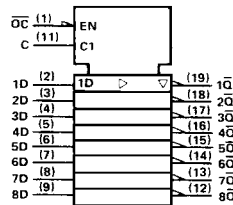
INPUTS			OUTPUT \overline{Q}
ENABLE	C	D	
\overline{OC}	C	D	
L	H	H	L
L	H	L	H
L	L	X	$\overline{Q_0}$
H	X	X	Z

logic symbols†

'ALS573B, 'AS573



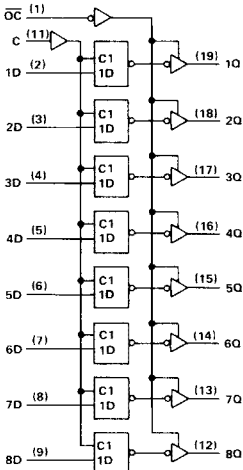
'ALS580A, 'AS580



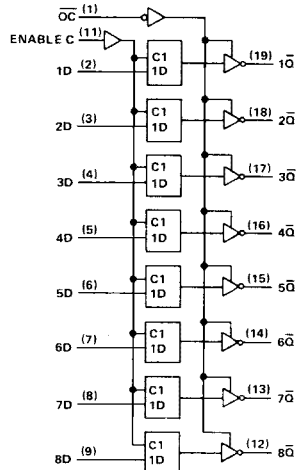
†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)

'ALS573B, 'AS573



'ALS580A, 'AS580



Pin numbers shown are for DW, J, and N packages.

SN54ALS573B, SN54ALS580A, SN74ALS573B, SN74ALS580A

OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

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; SN54ALS573B, SN54ALS580A	-55°C to 125°C
SN74ALS573B, SN74ALS580A	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54ALS573B SN54ALS580A			SN74ALS573B SN74ALS580A			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			V
I_{OH}	High-level output current				-2.6			mA
I_{OL}	Low-level output current				-24			mA
t_w	Pulse duration, enable C high	'ALS573B	10		10			ns
		'ALS580A	15		15			
t_{su}	Setup time, data before enable C↓	10			10			ns
t_h	Hold time, data after enable C↓	'ALS573B	7		7			ns
		'ALS580A	10		10			
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		SN54ALS573B SN54ALS580A		SN74ALS573B SN74ALS580A		UNIT	
			MIN	TYP†	MAX	MIN		TYP†
V_{IK}	$V_{CC} = 4.5\text{ V}$,	$I_I = -18\text{ mA}$			-1.2		V	
V_{OH}	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$,	$I_{OH} = -0.4\text{ mA}$	$V_{CC} - 2$		$V_{CC} - 2$		V	
	$V_{CC} = 4.5\text{ V}$,	$I_{OH} = -1\text{ mA}$	2.4	3.3				
	$V_{CC} = 4.5\text{ V}$,	$I_{OH} = -2.6\text{ mA}$			2.4	3.2		
V_{OL}	$V_{CC} = 4.5\text{ V}$,	$I_{OL} = 12\text{ mA}$	0.25	0.4	0.25	0.4	V	
	$V_{CC} = 4.5\text{ V}$,	$I_{OL} = 24\text{ mA}$			0.35	0.5		
I_{OZH}	$V_{CC} = 5.5\text{ V}$,	$V_O = 2.7\text{ V}$			20		μA	
I_{OZL}	$V_{CC} = 5.5\text{ V}$,	$V_O = 0.4\text{ V}$,			-20		μA	
I_I	$V_{CC} = 5.5\text{ V}$,	$V_I = 7\text{ V}$			0.1		mA	
I_{IH}	$V_{CC} = 5.5\text{ V}$,	$V_I = 2.7\text{ V}$			20		μA	
I_{IL}	$V_{CC} = 5.5\text{ V}$,	$V_I = 0.4\text{ V}$			-0.1		mA	
I_O^\ddagger	$V_{CC} = 5.5\text{ V}$,	$V_O = 2.25\text{ V}$	-30	-112	-30	-112	mA	
I_{CC}	'ALS573B	$V_{CC} = 5.5\text{ V}$	Outputs high		10	17	10	mA
			Outputs low		15	24	15	
			Outputs disabled		16	27	16	
			Outputs high		10	17	10	
			Outputs low		16	26	16	
			Outputs disabled		17	29	17	
I_{CC}	'ALS580A	$V_{CC} = 5.5\text{ V}$	Outputs high		10	17	10	mA
			Outputs low		15	24	15	
			Outputs disabled		16	27	16	
			Outputs high		10	17	10	
			Outputs low		16	26	16	
			Outputs disabled		17	29	17	

† All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

2
ALS and AS Circuits

SN54ALS573B, SN54ALS580A, SN74ALS573B, SN74ALS580A
OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

'ALS573B switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 25°C		V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX			UNIT
			'ALS573B		SN54ALS573B		SN74ALS573B	
			TYP	MIN	MAX	MIN	MAX	
t _{PLH}	D	Q	7	2	15	2	14	ns
t _{PHL}			7	2	15	2	14	
t _{PLH}	C	Q	12	8	25	8	20	ns
t _{PHL}			12	8	20	8	19	
t _{PZH}	\overline{OC}	Q	9	4	21	4	18	ns
t _{PZL}			11	4	21	4	18	
t _{PHZ}	\overline{OC}	Q	5	2	12	2	10	ns
t _{PLZ}			7	3	18	3	15	

'ALS580A switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 25°C		V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX			UNIT
			'ALS580A		SN54ALS580A		SN74ALS580A	
			TYP	MIN	MAX	MIN	MAX	
t _{PLH}	D	\overline{Q}	10	3	21	3	18	ns
t _{PHL}			8	3	15	3	14	
t _{PLH}	C	\overline{Q}	8	8	29	8	22	ns
t _{PHL}			14	8	22	8	21	
t _{PZH}	\overline{OC}	\overline{Q}	8	4	21	4	18	ns
t _{PZL}			10	4	21	4	18	
t _{PHZ}	\overline{OC}	\overline{Q}	5	2	12	2	10	ns
t _{PLZ}			7	3	18	3	15	

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

2 ALS and AS Circuits

SN54AS573, SN54AS580, SN74AS573, SN74AS580

OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

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: SN54AS573, SN54AS580	-55°C to 125°C
SN74AS573, SN74AS580	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54AS573 SN54AS580			SN74AS573 SN74AS580			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, enable C high	'AS573	5.5		4.5		ns	
		'AS580	3		2			
t_{su}	Setup time, data before enable C:	2			2			ns
t_h	Hold time, data after enable C:	3			3			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	SN54AS573 SN54AS580			SN74AS573 SN74AS580			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, $I_{OH} = -2.6$ mA	2.4	3.3					
V_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 32$ mA	0.28		0.5				V
	$V_{CC} = 4.5$ V, $I_{OL} = 48$ mA			0.33		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^{\ddagger}	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-30	-112		-30	-112		mA
I_{CC}	'AS573	$V_{CC} = 5.5$ V	Outputs high	56	93	56	93	mA
			Outputs low	55	90	55	90	
			Outputs disabled	65	106	65	106	
			Outputs high	62	100	62	100	
			Outputs low	65	106	65	106	
			Outputs disabled	71	115	71	115	

[†] All typical values are at $V_{CC} = 5$ V, $T_A = 25^\circ$ 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} .

2
ALS and AS Circuits

SN54AS573, SN54AS580, SN74AS573, SN74AS580
OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

'AS573 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V,}$ $C_L = 50 \text{ pF,}$ $R_1 = 500 \Omega,$ $R_2 = 500 \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			SN54AS573		SN74AS573		
			MIN	MAX	MIN	MAX	
t_{PLH}	D	Q	3	9	3	6	ns
t_{PHL}			3	7	3	6	
t_{PLH}	C	Q	6	14	6	11.5	ns
t_{PHL}			4	9	4	7.5	
t_{PZH}	\overline{OC}	Q	2	8	2	6.5	ns
t_{PZL}			4	11	4	9.5	
t_{PHZ}	\overline{OC}	Q	2	8	2	6.5	ns
t_{PLZ}			2	8	2	7	

'AS580 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V,}$ $C_L = 50 \text{ pF,}$ $R_1 = 500 \Omega,$ $R_2 = 500 \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			SN54AS580		SN74AS580		
			MIN	MAX	MIN	MAX	
t_{PLH}	D	\overline{Q}	3	10	3	7.5	ns
t_{PHL}			3	7.5	3	7	
t_{PLH}	C	\overline{Q}	5	12	5	9	ns
t_{PHL}			4	8.5	4	8	
t_{PZH}	\overline{OC}	\overline{Q}	2	7.5	2	6.5	ns
t_{PZL}			4	10.5	4	9.5	
t_{PHZ}	\overline{OC}	\overline{Q}	2	7.5	2	6.5	ns
t_{PLZ}			2	8	2	7	

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

2 ALS and AS Circuits