

TYPES SN54ALS573, SN54ALS580, SN54AS573, SN54AS580 SN74ALS573, SN74ALS580, SN74AS573, SN74AS580 OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

D2661, DECEMBER 1982—REVISED DECEMBER 1983

- 3-State Buffer-Type Outputs Drive Bus-Lines Directly
- Bus-Structured Pinout
- Choice of True or Inverting Logic

'ALS573, 'AS573	True Outputs
'ALS580, 'AS580	Inverting Outputs
- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic 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.

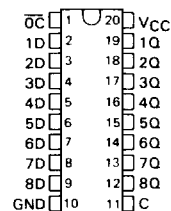
The output control (\overline{OC}) does not affect the internal operation of the latches. Old data can be retained or new data can be entered while the outputs are at high impedance.

The SN54ALS573, SN54AS573, SN54ALS580 and SN54AS580 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS573, SN74AS573, SN74ALS580, and SN74AS580 are characterized for operation from 0°C to 70°C .

SN54ALS573, SN54AS573 . . . J PACKAGE

SN74ALS573, SN74AS573 . . . N PACKAGE

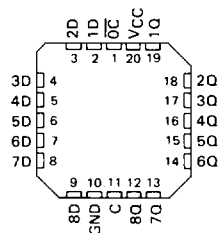
(TOP VIEW)



SN54ALS573, SN54AS573 . . . FH PACKAGE

SN74ALS573, SN74AS573 . . . FN PACKAGE

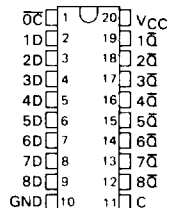
(TOP VIEW)



SN54ALS580, SN54AS580 . . . J PACKAGE

SN74ALS580, SN74AS580 . . . N PACKAGE

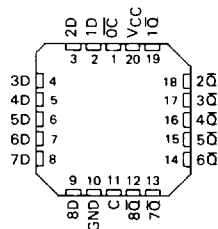
(TOP VIEW)



SN54ALS580, SN54AS580 . . . FH PACKAGE

SN74ALS580, SN74AS580 . . . FN PACKAGE

(TOP VIEW)



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ALS AND AS CIRCUITS

**TYPES SN54ALS573, SN54ALS580, SN54AS573, SN54AS580
SN74ALS573, SN74ALS580, SN74AS573, SN74AS580
OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS**

FUNCTION TABLES

'ALS573, 'AS573
(EACH LATCH)

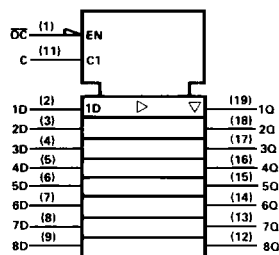
INPUTS			OUTPUT Q
ENABLE	C	D	
\overline{OC}	C	D	
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

'ALS580, 'AS580
(EACH LATCH)

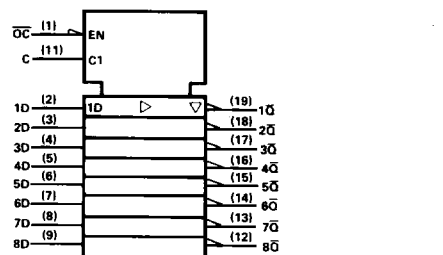
INPUTS			OUTPUT \overline{Q}
ENABLE	C	D	
\overline{OC}	C	D	
L	H	H	L
L	H	L	H
L	L	X	\overline{Q}_0
H	X	X	Z

logic symbols

'ALS573, 'AS573



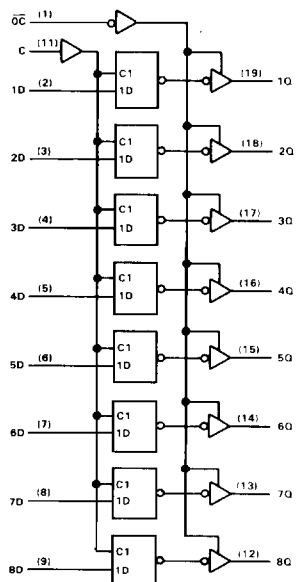
'ALS580, 'AS580



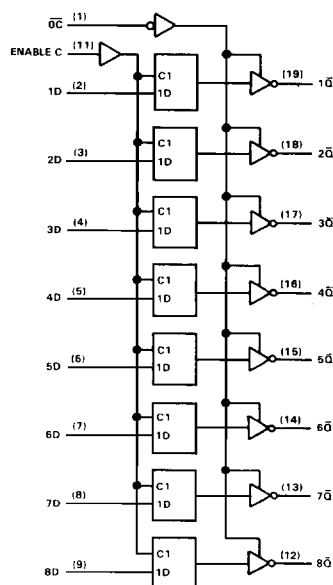
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logic diagram (positive logic)

'ALS573, 'AS573



'ALS580, 'AS580



Pin numbers shown are for J and N packages

ALS AND AS CIRCUITS

TYPES SN54ALS573, SN54ALS580, SN74ALS573, SN74ALS580 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: SN54ALS573, SN54ALS580	-55 °C to 125 °C
SN74ALS573, SN74ALS580	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

recommended operating conditions

		SN54ALS573 SN54ALS580			SN74ALS573 SN74ALS580			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			-1			-2.6	mA
I_{OL}	Low-level output current			12			24	mA
t_w	Pulse duration, enable C high	'ALS573	10		10			ns
		'ALS580	15		15			
t_{su}	Setup time, data before enable C ↓		10		10			ns
t_h	Hold time, data after enable C ↓	'ALS573	7		7			ns
		'ALS580	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	SN54ALS573 SN54ALS580			SN74ALS573 SN74ALS580			UNIT
		MIN	TYP [†]	MAX	MIN	TYP [†]	MAX	
V_{IK}	$V_{CC} = 4.5$ V, $I_I = -18$ mA			-1.5			-1.5	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			-0.1			-0.1	mA
I_O^{\ddagger}	$V_{CC} = 5.5$ V, $V_O = 2.25$ V			-15			-15	mA
I_{CC}	'ALS573	$V_{CC} = 5.5$ V	Outputs high	10	17	10	17	mA
			Outputs low	15	24	15	24	
			Outputs disabled	16	27	16	27	
			Outputs high	10	17	10	17	
			Outputs low	15	24	15	24	
			Outputs disabled	16	27	16	27	
I_{CC}	'ALS580	$V_{CC} = 5.5$ V	Outputs high	10	17	10	17	mA
			Outputs low	15	24	15	24	
			Outputs disabled	16	27	16	27	
			Outputs high	10	17	10	17	
			Outputs low	15	24	15	24	
			Outputs disabled	16	27	16	27	

[†]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} .

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ALS AND AS CIRCUITS

TYPES SN54ALS573, SN54ALS580, SN74ALS573, SN74ALS580
OCTAL D-TYPE TRANSPARENT LATCHES WITH 3-STATE OUTPUTS

***ALS573 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
			SN54ALS573		SN74ALS573		
			MIN	MAX	MIN	MAX	
t_{PLH}	D	Q	2	15	2	14	ns
t_{PHL}			2	15	2	14	
t_{PLH}	C	Q	8	27	8	20	ns
t_{PHL}			8	20	8	19	
t_{PZH}	\overline{OC}	Q	4	21	4	18	ns
t_{PZL}			4	21	4	18	
t_{PHZ}	\overline{OC}	Q	2	10	2	8	ns
t_{PLZ}			3	15	3	13	

***ALS580 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
			SN54ALS580		SN74ALS580		
			MIN	MAX	MIN	MAX	
t_{PLH}	D	\overline{Q}	3	21	3	18	ns
t_{PHL}			3	15	3	14	
t_{PLH}	C	\overline{Q}	8	29	8	22	ns
t_{PHL}			8	22	8	21	
t_{PZH}	\overline{OC}	\overline{Q}	4	21	4	18	ns
t_{PZL}			4	21	4	18	
t_{PHZ}	\overline{OC}	\overline{Q}	2	10	2	8	ns
t_{PLZ}			3	15	3	13	

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

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ALS AND AS CIRCUITS

TYPES 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, $I_{OH} = -15$ 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	
	'AS580	$V_{CC} = 5.5$ 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, $T_A = 25$ °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} .

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ALS AND AS CIRCUITS

TYPES 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: For load circuit and voltage waveforms, see page 1-12.