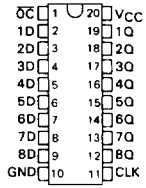
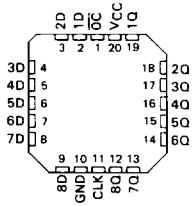
- **3-State Buffer-Type Noninverting Outputs Drive Bus-Lines Directly**
- **Bus-Structured Pinout**
- **Buffered Control Inputs**
- **'ALS575 and 'AS575 Have Synchronous Clear**
- **Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

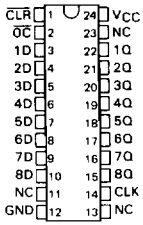
SN54ALS574, SN54AS574 . . . J PACKAGE
SN74ALS574, SN74AS574 . . . N PACKAGE
(TOP VIEW)



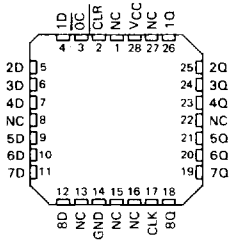
SN54ALS574, SN54AS574 . . . FH PACKAGE
SN74ALS574, SN74AS574 . . . FN PACKAGE
(TOP VIEW)



SN54ALS575, SN54AS575 . . . JT PACKAGE
SN74ALS575, SN74AS575 . . . NT PACKAGE
(TOP VIEW)



SN54ALS575, SN54AS575 . . . FH PACKAGE
SN74ALS575, SN74AS575 . . . FN PACKAGE



NC – No internal connection

description

These 8-bit registers feature three-state outputs designed specifically for bus driving. They are particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight edge-triggered D-type flip-flops enter data on the low-to-high transition of the clock. The 'ALS575 and 'AS575 may be synchronously cleared by taking the CLR input low.

The output-control does not affect the internal operation of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

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.

FUNCTION TABLES

'ALS574, 'AS574
(EACH FLIP-FLOP)

INPUTS			OUTPUT
$\overline{OC}$	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	L	X	Q_0
H	X	X	Z

'ALS575, 'AS575
(EACH FLIP-FLOP)

INPUTS				OUTPUT
$\overline{OC}$	$\overline{CLR}$	CLK	D	Q
L	L	↑	X	L
L	H	↑	H	H
L	H	↑	L	L
L	H	L	X	Q_0
H	X	X	X	Z

2 ALS AND AS CIRCUITS

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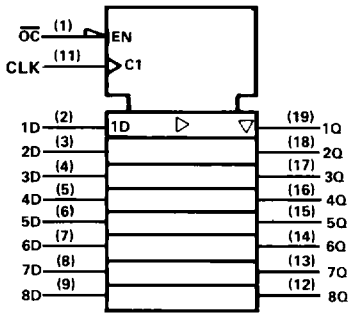
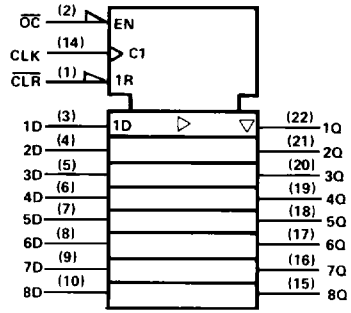
logic symbols

'ALS574, 'AS574

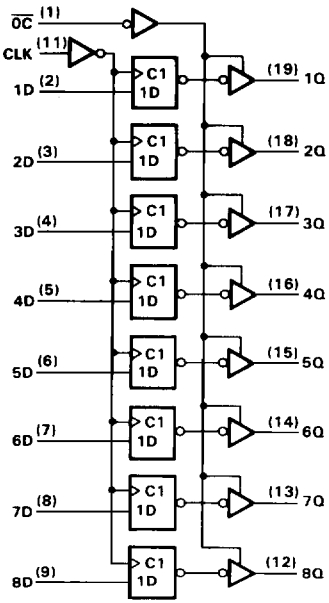


'ALS575, 'AS575



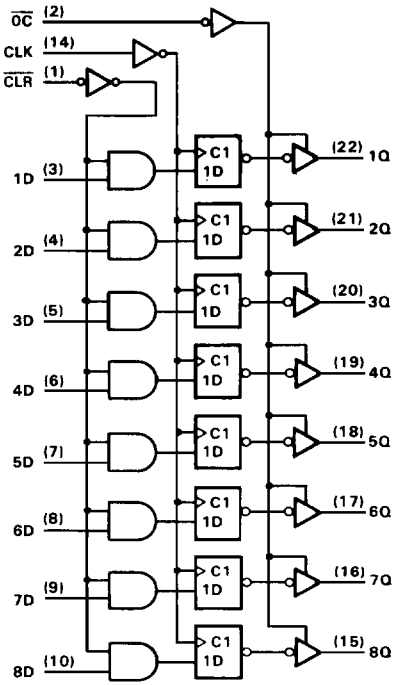
logic diagrams (positive logic)

'ALS574, 'AS574



Pin numbers shown are for J and N packages.

'ALS575, 'AS575



Pin numbers shown are for JT and NT packages.

TEXAS INSTRUMENTS
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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: SN54ALS574, SN54ALS575 . . . . . −55°C to 125°C
SN74ALS574, SN74ALS575 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

recommended operating conditions

				SN54ALS574 SN54ALS575			SN74ALS574 SN74ALS575			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
f_{clock}	Clock frequency	'ALS574		0		30	0		35	MHz
		'ALS575		0		25	0		30	
t_w	Pulse duration	'ALS574 CLK high or low		16.5			14			ns
		'ALS575 CLK high or low		20			16.5			
t_{su}	Setup time before CLK↑	Data		15			15			ns
		'ALS575	$\overline{CLR}$ high	20			20			
			$\overline{CLR}$ low	15			15			
t_h	Hold time after CLK↑	Data		4			0			ns
		'ALS575	$\overline{CLR}$	0			0			
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			SN54ALS574 SN54ALS575			SN74ALS574 SN74ALS575			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				−0.2			−0.2	mA
I_O‡	V_{CC} = 5.5 V,	V_O = 2.25 V		−15		−70	−15		−70	mA
I_{CC}	V_{CC} = 5.5 V		Output high		10	17		10	17	mA
			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}.

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
			SN54ALS574 SN54ALS575		SN74ALS574 SN74ALS575		
			MIN	MAX	MIN	MAX	
f_{max}	'ALS574		30		35		MHz
	'ALS575		25		30		
t_{PLH}	CLK	Any Q	4	15	4	14	ns
t_{PHL}			4	15	4	14	
t_{PZH}	OC	Any Q	4	21	4	18	ns
t_{PZL}			4	21	4	18	
t_{PHZ}	$\overline{OC}$	Any Q 'ALS574	2	10	2	8	ns
		Any Q 'ALS575	2	12	2	10	
t_{PLZ}		Any Q	3	15	3	13	

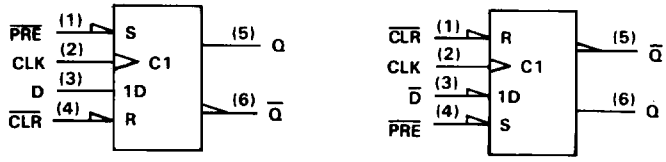
NOTE 1: For load circuit and voltage waveforms, see page 1-12.

D flip-flop signal conventions

2 ALS AND AS CIRCUITS

It is TI practice to name the outputs and other inputs of a D-type flip-flop and to draw its logic symbol based on the assumption of true data (D) inputs. Then outputs that produce data in phase with the data inputs are called Q and those producing complementary data are called $\overline{Q}$. An input that causes a Q output to go high or a $\overline{Q}$ output to go low is called Preset; an input that causes a $\overline{Q}$ output to go high or a Q output to go low is called Clear. Bars are used over these pin names ($\overline{PRE}$ and $\overline{CLR}$) if they are active low.

In some applications it may be advantageous to redesignate the data input $\overline{D}$. In that case all the other inputs and outputs should be renamed as shown below. Also shown are corresponding changes in the graphical symbol. Arbitrary pin numbers are shown in parentheses.



Notice that Q and $\overline{Q}$ exchange names, which causes Preset and Clear to do likewise. Also notice that the polarity indicators (⊐) on $\overline{PRE}$ and $\overline{CLR}$ remain since these inputs are still active-low, but that the presence or absence of the polarity indicator changes at $\overline{D}$, Q, and $\overline{Q}$. Of course pin 5 ($\overline{Q}$) is still in phase with the data input $\overline{D}$, but now both are considered active-low.

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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: SN54AS574, SN54AS575 . . . . . −55 °C to 125 °C
SN74AS574, SN74AS575 . . . . . 0 °C to 70 °C
Storage temperature range . . . . . −65 °C to 150 °C

recommended operating conditions

				SN54AS574 SN54AS575			SN74AS574 SN74AS575			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
f_{clock}	Clock frequency			0		100	0		125	MHz
t_w	Pulse duration	CLK high		5			4			ns
		CLK low		3			2			
tsu	Setup time before CLK↑	Data		3			2			ns
		'AS575	$\overline{CLR}$ high or low	6.5			5.5			
t_h	Hold time after CLK↑	Data		3			2			ns
		'ALS575	$\overline{CLR}$	0			0			
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		SN54AS574 SN54AS575			SN74AS574 SN74AS575			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		0.29	0.5				V
		V_{CC} = 4.5 V,	I_{OL} = 48 mA					0.34	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}	$\overline{OC}$, CLK, $\overline{CLR}$	V_{CC} = 5.5 V,	V_I = 0.4 V			−0.5			−0.5	mA
	D					−3			−2	
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	'AS574	V_{CC} = 5.5 V	Outputs high		73	116		73	116	mA
			Outputs low		85	134		85	134	
			Outputs disabled		84	134		84	134	
	'AS575		Outputs high		78	126		78	126	
			Outputs low		88	142		88	142	
			Outputs disabled		88	142		88	142	

†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
			SN54AS574 SN54AS575		SN74AS574 SN74AS575		
			MIN	MAX	MIN	MAX	
f_{max}			100		125		MHz
t_{PLH}	CLK	Any Q	3	11	3	8	ns
t_{PHL}			4	11	4	9	
t_{PZH}	$\overline{OC}$	Any Q	2	7	2	6	ns
t_{PZL}			3	11	3	10	
t_{PHZ}	$\overline{OC}$	Any Q	2	7	2	6	ns
t_{PLZ}			2	7	2	6	

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

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