

SN54ALS574A, SN54ALS575A, SN54AS574, SN54AS575 SN74ALS574B, SN74ALS575A, SN74AS574, SN74AS575 OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

SDAS165 – D2261, JUNE 1982 – REVISED JANUARY 1989

- 3-State Buffer-Type Noninverting Outputs Drive Bus-Lines Directly
- Bus-Structured Pinout
- Buffered Control Inputs
- 'ALS575A 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

description

These 8-bit registers feature 3-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 'ALS575A and 'AS575 may be synchronously cleared by taking the $\overline{\text{CLR}}$ 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

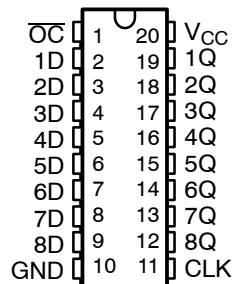
'ALS574, ALS574
(each flip-flop)

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

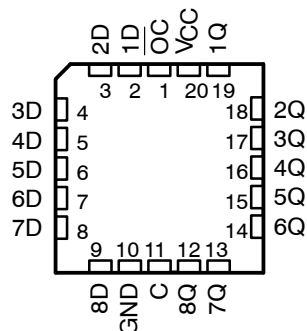
'ALS575, ALS575
(each flip-flop)

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

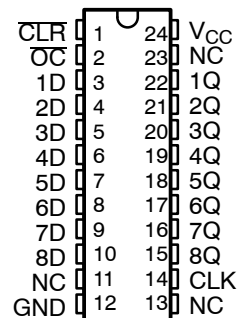
SN54ALS574A, SN54AS574 ... J PACKAGE
SN74ALS574B, SN74AS574 ... DW OR N PACKAGE
(TOP VIEW)



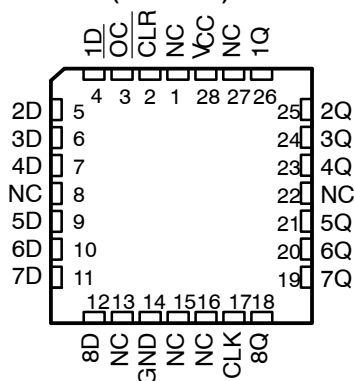
SN54ALS574A, SN54AS574 ... FK PACKAGE
(TOP VIEW)



SN54ALS575A, SN54AS575 ... T PACKAGE
SN74ALS575A, SN74AS575 ... DW OR NT PACKAGE
(TOP VIEW)



SN54ALS575A, SN54AS575 ... FK PACKAGE
SN74ALS575A, SN74AS575 ... FN PACKAGE
(TOP VIEW)



NC – No internal connection

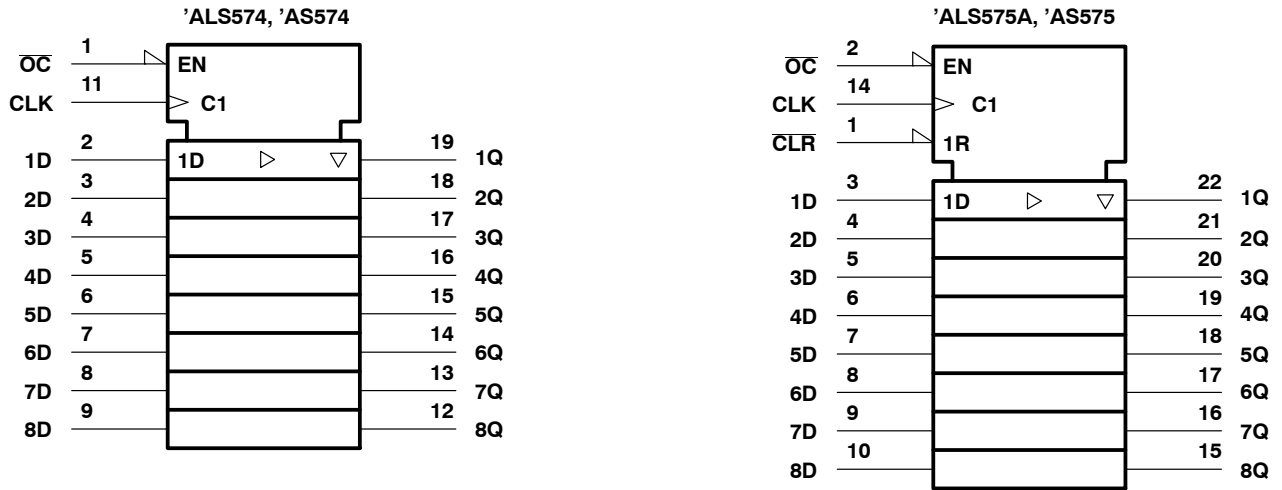
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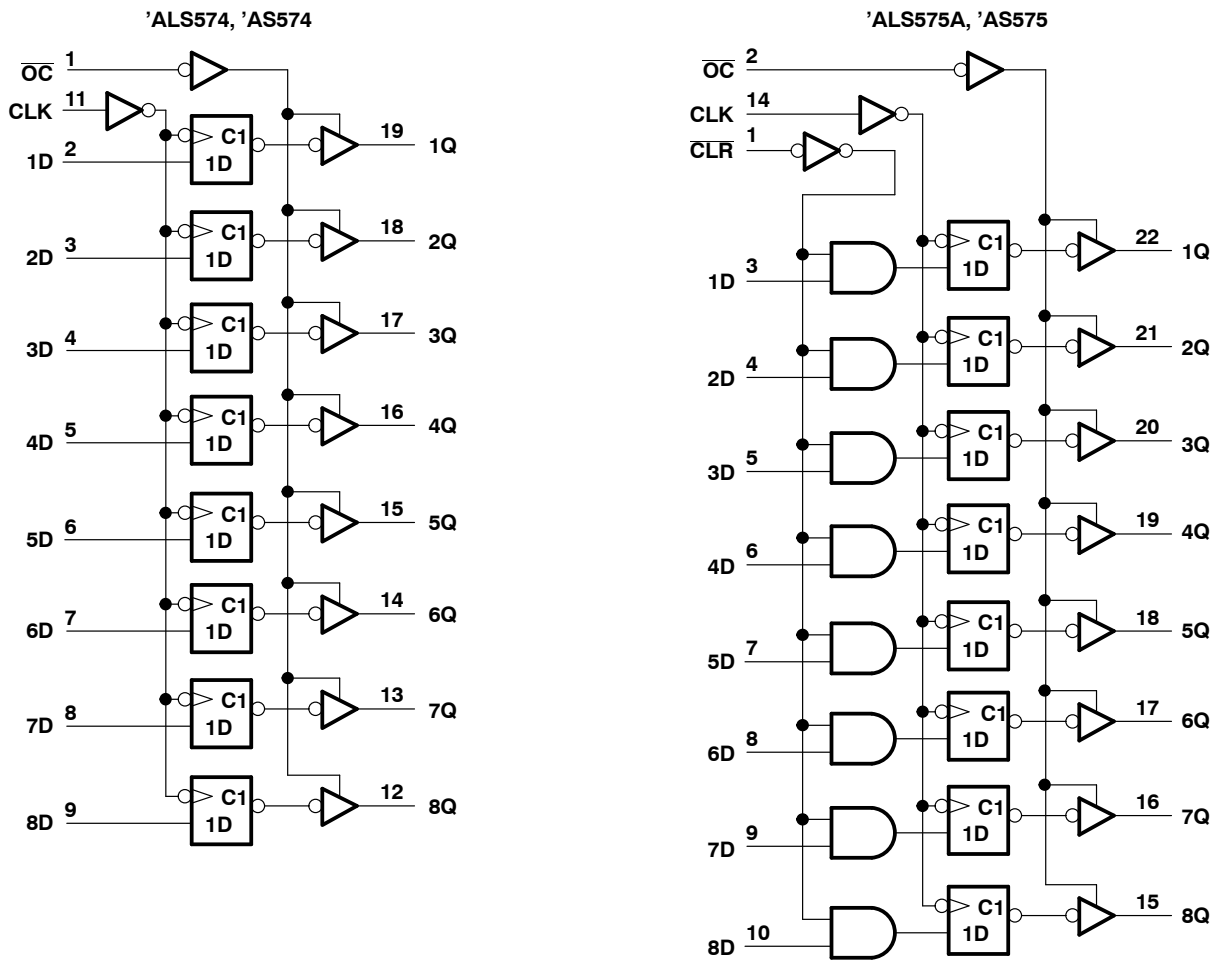
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logic symbols†



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

logic diagrams (positive logic)



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

SN54ALS574A, SN54ALS575A, SN74ALS574B, SN74ALS575A OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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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: SN54ALS574A, SN54ALS575A	–55°C to 125°C
SN74ALS574B, SN74ALS575A	0°C to 70°C
Storage temperature range	–65°C to 150°C

recommended operating conditions

		SN54ALS574A SN54ALS575A			SN74ALS574B SN74ALS575A			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
f_{clock}	Clock frequency	'ALS574	0	28	0	35		MHz
		'ALS575A	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
		'ALS575A CLR	15		15			
t_h	Hold time after CLK↑	Data	4		0			ns
		'ALS575A CLR	0		0			
T_A	Operating free-air temperature	–55		125	0		70	°C



SN54ALS574A, SN54ALS575A, SN74ALS574B, SN74ALS575A OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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

PARAMETER	TEST CONDITIONS		SN54ALS574A SN54ALS575A			SN74ALS574B SN74ALS575A			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^\ddagger	$V_{CC} = 5.5 V$,	$V_O = 2.25 V$	-30		-112	-30		-112	mA	
I_{CC}	'ALS574	$V_{CC} = 5.5 V$	Outputs high		11	18	11 18		mA	
			Outputs low		17	27	17 27			
			Outputs disabled		17	28	17 28			
			'ALS575	Outputs high		10	17	10 17		
				Outputs low		15	24	15 24		
				Outputs disabled		16	30	16 30		

† 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} .

'ALS574 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5 V$, $C_L = 50 pF$, $R_1 = 500 \Omega$, $R_2 = 500 \Omega$, $T_A = 25^\circ C$		$V_{CC} = 4.5 V$ to $5.5 V$, $C_L = 50 pF$, $R_1 = 500 \Omega$, $R_2 = 500 \Omega$, $T_A = MIN$ to MAX^\S				UNIT
			'ALS574		SN54ALS574A		SN74ALS574B		
			TYP		MIN	MAX	MIN	MAX	
f_{max}			50		28		35		MHz
t_{PLH}	CLK	Q	8		4	22	3	14	ns
t_{PHL}			8		4	17	4	14	
t_{PZH}	\overline{OC}	Q	9		4	21	3	18	ns
t_{PZL}			12		4	26	4	18	
t_{PHZ}	\overline{OC}	Q	5		2	16	1	10	ns
t_{PLZ}			5		2	25	2	12	

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

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the *ALS/AS Logic Data Book*, 1986.



SN54ALS575A, SN74ALS575A OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V},$ $C_L = 50\text{ pF},$ $R_1 = 500\ \Omega,$ $R_2 = 500\ \Omega,$ $T_A = 25^\circ\text{C}$			$V_{CC} = 4.5\text{ V to }5.5\text{ V},$ $C_L = 50\text{ pF},$ $R_1 = 500\ \Omega,$ $R_2 = 500\ \Omega,$ $T_A = \text{MIN to MAX}^\dagger$			UNIT	
			'ALS575A			SN54ALS575A		SN74ALS575A		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
f_{max}			40	50		25		30	MHz	
t_{PLH}	CLK	Q		8	11	4	15	4	14	ns
t_{PHL}				9	11.5	4	15	4	14	
t_{PZH}	$\overline{\text{OC}}$	Q		11	14	4	21	4	18	ns
t_{PZL}				12	15	4	21	4	18	
t_{PHZ}	$\overline{\text{OC}}$	Q		6	8	2	12	2	10	ns
t_{PLZ}				8	11	3	15	3	13	

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

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the *ALS/AS Logic Data Book*, 1986.

SN54AS574, SN54AS575, SN74AS574, SN74AS575

OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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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		4		2		
t_{su}	Setup time before CLK↑	Data		3		2		ns
		'AS575	CLR high or low	6.5		5.5		
t_h	Hold time after CLK↑	Data		3		2		ns
		'AS575	CLR	0		0		
T_A	Operating free-air temperature	-55		125	0		70	°C



SN54AS574, SN54AS575, SN74AS574, SN74AS575 OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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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}	OC, CLK, CLR	V _{CC} = 5.5 V, V _O = 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		89	142	89	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, R ₁ = 500 Ω, R ₂ = 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}	OC	Any Q	2	7	2	6	ns
t _{PZL}			3	11	3	10	
t _{PHZ}	OC	Any Q	2	7	2	6	ns
t _{PLZ}			2	7	2	6	

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

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the *ALS/AS Logic Data Book*, 1986.



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