

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

D2661, JUNE 1982 - REVISED JANUARY 1989

- 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

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 '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

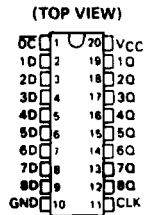
'ALS574, 'AS574
(EACH FLIP-FLOP)

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

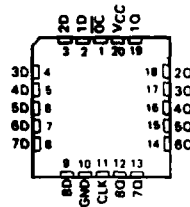
'ALS575, 'AS575
(EACH FLIP-FLOP)

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

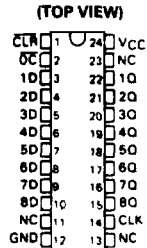
SN54ALS574A, SN54AS574 ... J PACKAGE
SN74ALS574B, SN74AS574 ... DW OR N PACKAGE



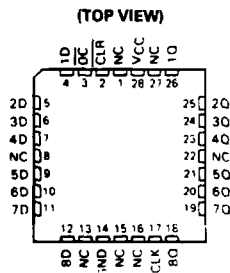
SN54ALS574A, SN54AS574 ... FK PACKAGE
(TOP VIEW)



SN54AS575 ... JT PACKAGE
SN74ALS575A, SN74AS575 ... DW OR NT PACKAGE



SN54AS575 ... FK PACKAGE
SN74ALS575A, SN74AS575 ... FN PACKAGE



NC - No internal connection

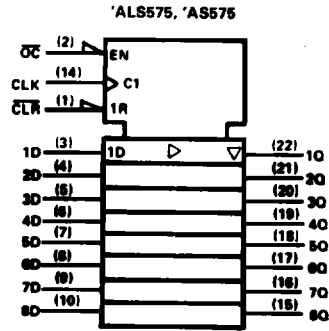
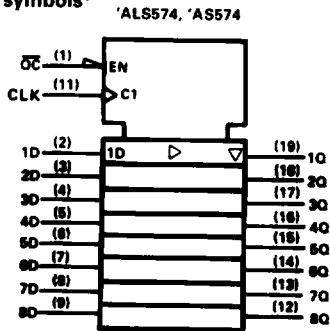
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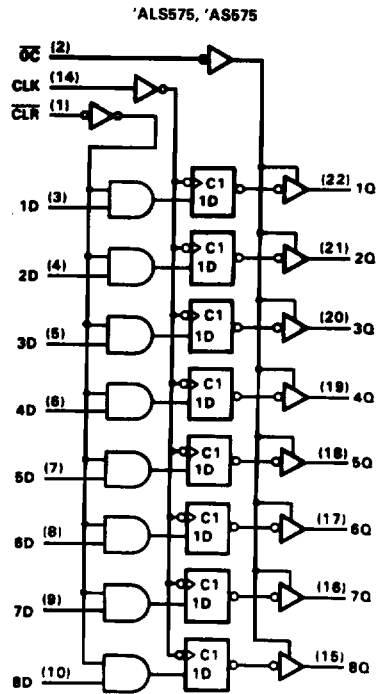
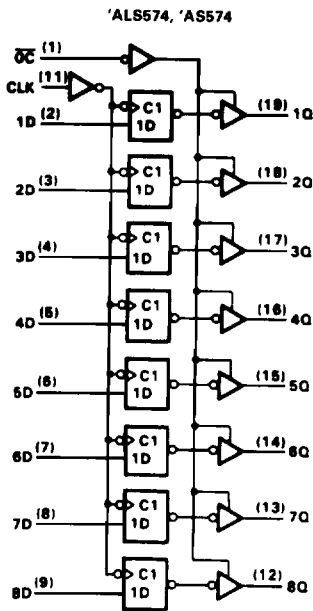
SN74ALS574B, SN74ALS575A, SN74AS574, SN74AS575
SN54ALS574A, SN54AS574, SN54AS575
OCTAL D-TYPE EDGE-TRIGGERED FLIP-FLOPS WITH 3-STATE OUTPUTS

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.

Pin numbers shown are for DW, JT, and NT packages.

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

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

Supply voltage, VCC	7 V
Input voltage	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature range: SN54ALS574A	-55°C to 125°C
SN74ALS574B, SN74ALS575A	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54ALS574A			SN74ALS574B SN74ALS575A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
VCC	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	
		'ALS575			0	30		
t _w	Pulse duration	'ALS574 CLK high or low	18.5		14		ns	
		'ALS575 CLK high or low	20		16.5			
t _{su}	Setup time before CLK ↑	Data	15		15		ns	
		'ALS575 $\overline{\text{CLR}}$			15			
t _h	Hold time after CLK ↓	Data	4		0		ns	
		'ALS575 $\overline{\text{CLR}}$			0			
T _A	Operating free-air temperature	-55	125		0	70	°C	

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

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

PARAMETER	TEST CONDITIONS		SN54ALS574A			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*}	V _{CC} = 5.5 V.	V _O = 2.25 V			-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	
			Outputs high		10	17		10	17	
			Outputs low		15	24		15	24	
			Outputs disabled		16	30		16	30	
	'ALS575	V _{CC} = 5.5 V	Outputs high		11	18		11	18	mA
			Outputs low		17	27		17	27	
			Outputs disabled		17	28		17	28	
			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 °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 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
			'ALS574	SN54ALS574A		SN74ALS574B		
			TYP	MIN	MAX	MIN	MAX	
f _{max}			50	28		35		MHz
t _{PLH}	CLK	0	8	4	22	3	14	ns
t _{PHL}			8	4	17	4	14	
t _{PZH}	OC	0	9	4	21	3	18	ns
t _{PZL}			12	4	26	4	18	
t _{PHZ}	OC	0	5	2	16	1	10	ns
t _{PLZ}			5	2	25	2	12	

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

SN74ALS575A

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

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
			ALS575		SN74ALS575A		
			TYP	MIN	MAX		
f _{max}			40	50	30		MHz
t _{PLH}	CLK	Q	8	11	4	14	ns
t _{PHL}			9	11.5	4	14	
t _{PZH}	\overline{OC}	Q	11	14	4	18	ns
t _{PZL}			12	15	4	18	
t _{PHZ}	\overline{OC}	Q	6	8	2	10	ns
t _{PZL}			8	11	3	13	

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

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

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

Supply voltage, VCC	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				
VCC	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			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		
		'ALS575	CLR high or low	6.5			5.5				
t _h	Hold time after CLK ↓	Data		3			2		ns		
		'ALS575	CLR	0			0				
T _A	Operating free-air temperature	-55			125			0		70	°C

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

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 _{QH} = -2 mA	V _{CC} -2		V _{CC} -2		V		
	V _{CC} = 4.5 V,	I _{QH} = -12 mA	2.4	3.2					
	V _{CC} = 4.5 V,	I _{QH} = -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 _I = 0.4 V	-0.6		-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}	'ALS574	V _{CC} = 5.5 V	Outputs high		73	116	73	116	mA
			Outputs low		85	134	85	134	
			Outputs disabled		84	134	84	134	
			Outputs high		78	126	78	126	
			Outputs low		89	142	89	142	
			Outputs disabled		88	142	88	142	
I _{CC}	'ALS575	V _{CC} = 5.5 V	Outputs high		73	116	73	116	mA
			Outputs low		85	134	85	134	
			Outputs disabled		84	134	84	134	
			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	

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