

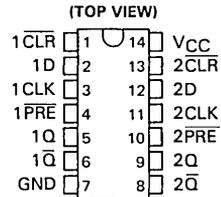
TYPES SN54ALS74, SN54AS74, SN74ALS74, SN74AS74 DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH CLEAR AND PRESET

D2661, APRIL 1982—REVISED DECEMBER 1983

- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

TYPE	TYPICAL CLOCK FREQUENCY ($C_L = 50$ pF)	MAXIMUM DISSIPATION PER FLIP-FLOP	TYPICAL POWER DISSIPATION PER FLIP-FLOP
'ALS74	50 MHz	6 mW	
'AS74	134 MHz	26 mW	

SN54ALS74, SN54AS74 . . . J PACKAGE
SN74ALS74, SN74AS74 . . . N PACKAGE

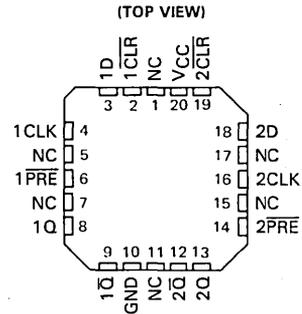


description

These devices contain two independent D-type positive-edge-triggered flip-flops. A low level at the Preset or Clear inputs sets or resets the outputs regardless of the levels of the other inputs. When Preset and Clear are inactive (high), data at the D input meeting the setup time requirements are transferred to the outputs on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level and is not directly related to the rise time of the clock pulse. Following the hold time interval, data at the D input may be changed without affecting the levels at the outputs.

The SN54ALS74 and SN54AS74 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS74 and SN74AS74 are characterized for operation from 0°C to 70°C .

SN54ALS74, SN54AS74 . . . FH PACKAGE
SN74ALS74, SN74AS74 . . . FN PACKAGE



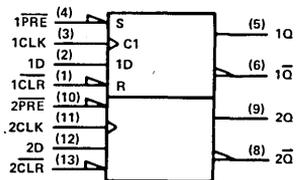
NC—No internal connection

FUNCTION TABLE

INPUTS				OUTPUTS	
PRESET	CLEAR	CLOCK	D	Q	Q̄
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q ₀	Q̄ ₀

*The output levels in this configuration are not guaranteed to meet the minimum levels for V_{OH} if the lows at Preset and Clear are near V_{IL} maximum. Furthermore, this configuration is nonstable; that is, it will not persist when either Preset or Clear returns to its inactive (high) level.

logic symbol



Pin numbers shown are for J and N packages.

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

Supply voltage, V_{CC}	7 V
Input voltage	7 V
Operating free-air temperature range: SN54ALS74, SN54AS74	-55°C to 125°C
SN74ALS74, SN74AS74	0°C to 70°C
Storage temperature range	-65°C to 150°C

TYPES SN54ALS74, SN74ALS74 DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH CLEAR AND PRESET

recommended operating conditions

		SN54ALS74			SN74ALS74			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	-0.4			-0.4			mA
I _{OL}	Low-level output current	4			8			mA
f _{clock}	Clock frequency	0	30	0	34	34	MHz	
t _w	Pulse duration	PRE or CLR low		15	15		ns	
		CLK high		16.5	14.5			
		CLK low		16.5	14.5			
t _{su}	Setup time before CLK1	Data		15	15		ns	
		PRE or CLR inactive		10	10			
t _h	Hold time, data after CLK1	0			0			ns
T _A	Operating free-air temperature	-55	125	0	70	70	°C	

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

PARAMETER	TEST CONDITIONS	SN54ALS74			SN74ALS74			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 _{OL}	V _{CC} = 4.5 V, I _{OL} = 4 mA	0.25	0.4	0.25	0.4			
	V _{CC} = 4.5 V, I _{OL} = 8 mA			0.35	0.5			
I _I	CLK or D	0.1			0.1			mA
	PRE or CLR	0.2			0.2			
I _{IH}	CLK or D	20			20			μA
	PRE or CLR	40			40			
I _{IL}	CLK or D	-0.2			-0.2			mA
	PRE or CLR	-0.4			-0.4			
I _O ‡	V _{CC} = 5.5 V, V _O = 2.25 V	-10	-60	-10	-60			
I _{CC}	V _{CC} = 5.5 V, See Note 1	2.4	4	2.4	4			

†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}.

NOTE 1: I_{CC} is measured with J, K, CLK, and PRE grounded, then with J, K, CLK, and CLR grounded.

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX				UNIT
			SN54ALS74		SN74ALS74		
			MIN	MAX	MIN	MAX	
f _{max}			30		34	MHz	
t _{PLH}	PRE or CLR	Q or Q̄	3	15	3	13	ns
t _{PHL}			5	17	5	15	
t _{PLH}	CLK	Q or Q̄	5	18	5	16	ns
t _{PHL}			7	20	7	18	

NOTE 2: For load circuit and voltage waveforms, see page 1-12.

TYPES SN54AS74, SN74AS74

DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH CLEAR AND PRESET

recommended operating conditions

		SN54AS74			SN74AS74			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	-2			-2			mA
I _{OL}	Low-level output current	20			20			mA
f _{clock}	Clock frequency	0	90		0	105		MHz
t _w	Pulse duration	PRE or CLR low		4		4		ns
		CLK high		4		4		
		CLK low		5.5		5.5		
t _{su}	Setup time before CLK1	Data		4.5		4.5		ns
		PRE or CLR inactive		2		2		
t _h	Hold time, data after CLK1	0			0			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		SN54AS74			SN74AS74			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 _{OL}		V _{CC} = 4.5 V, I _{OL} = 20 mA		0.25	0.5		0.25	0.5		V
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}	CLK or D	V _{CC} = 5.5 V, V _I = 0.4 V		-0.5			-0.5			mA
	PRE or CLR			-1.5			-1.5			
I _O [‡]		V _{CC} = 5.5 V, V _O = 2.25 V		-30	-112		-30	-112		mA
I _{CC}		V _{CC} = 5.5 V, See Note 1		10.5	16		10.5	16		mA

[†]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}.

NOTE 1: I_{CC} is measured with D, CLK, and PRE grounded, then with D, CLK, and CLR grounded.

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX				UNIT
			SN54AS74		SN74AS74		
			MIN	MAX	MIN	MAX	
f _{max}			90	105		MHz	
t _{PLH}	PRE or CLR	Q or Q̄	3	8.5	3	7.5	ns
t _{PHL}			3.5	11.5	3.5	10.5	
t _{PLH}	CLK	Q or Q̄	3.5	9	3.5	8	ns
t _{PHL}			4.5	10.5	4.5	9	

NOTE 2: For load circuit and voltage waveforms, see page 1-12.

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