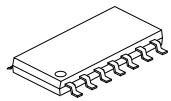


U74AC74

CMOS IC

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



SOP-14

■ DESCRIPTION

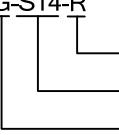
The **U74AC74** is a dual positive-edge-triggered D-type flip-flop. The preset (PRE) and clear (CLR) input can set or reset the output at a low level ,regardless of the level of others inputs .when the PRE and CLR are inactive(high), data at the data D input meeting the set-up time requirements is transferred to the outputs on the positive-going edge of the clock pulse. Following the hold-time interval, data D can be changed without affecting the levels at the outputs.

■ FEATURES

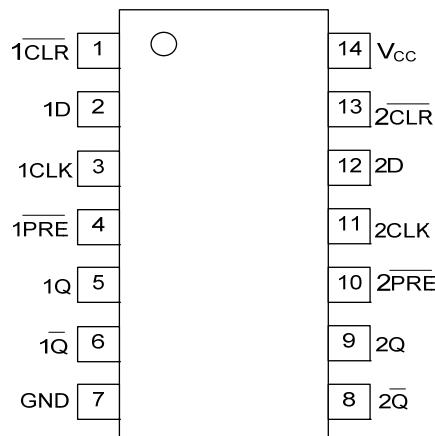
- * Operating voltage range: $V_{CC}(OPR)=2V$ to $6V$.
- * Inputs accept voltages to $6V$
- * Max tpd at $10ns$ of $5V$

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AC74L-S14-R	U74AC74G-S14-R	SOP-14	Tape Reel

U74AHC08G-S14-R 	(1) R: Tape Reel (2) S14: SOP-14 (3) L: Lead Free, G:Halogen Free
--	---

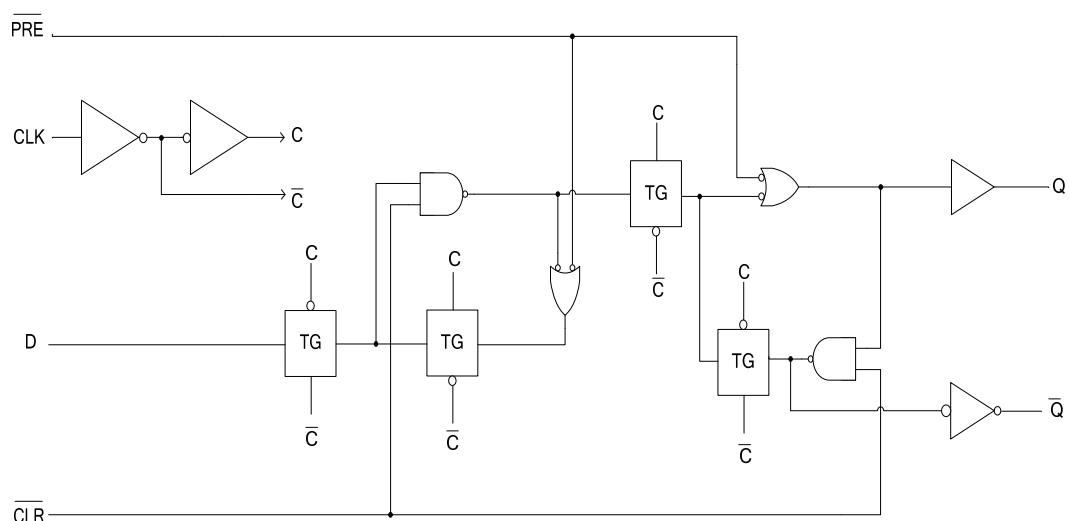
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

INPUT			OUTPUT		
\overline{PRE}	\overline{CLR}	CLK	D	Q	\overline{Q}
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	Q0	Q0

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING ($T_A=25^\circ\text{C}$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5~7	V
Input Voltage	V_{IN}	-0.5~ $V_{CC}+0.5$	V
Output Voltage(active mode)	V_{OUT}	-0.5~ $V_{CC}+0.5$	V
Input Clamp Current($V_{IN}<0$)	I_{IK}	-20(MIN)	mA
Output Clamp Current($V_{OUT}<0$)	I_{OK}	± 20	mA
Output Current	I_{OUT}	± 50	mA
V_{CC} or GND Current	I_{CC}	± 200	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2		6	V
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
High-level input voltage	V_{IH}	$V_{CC}=3V$	2.1			V
		$V_{CC}=4.5V$	3.15			
		$V_{CC}=5.5V$	3.85			
Low-level input voltage	V_{IL}	$V_{CC}=3V$			0.9	V
		$V_{CC}=4.5V$			1.35	
		$V_{CC}=5.5V$			1.65	
High-level Output Current	I_{OH}	$V_{CC}=3V$			-12	mA
		$V_{CC}=4.5V$			-24	
		$V_{CC}=5.5V$			-24	
Low-level Output Current	I_{OL}	$V_{CC}=3V$			12	mA
		$V_{CC}=4.5V$			24	
		$V_{CC}=5.5V$			24	
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$				8	ns/V
Operating Temperature	T_A		-40		+85	°C

■ STATIC CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	V_{OH}	$I_{OH}=-50\mu\text{A}$ $V_{CC}=3V$	2.9			V
		$V_{CC}=4.5V$	4.4			
		$V_{CC}=5.5V$	5.4			
		$I_{OH}=-12\text{mA}$ $V_{CC}=3V$	2.56			
		$V_{CC}=4.5V$	3.86			
		$V_{CC}=5.5V$	4.86			
Low-Level Output Voltage	V_{OL}	$I_{OL}=-50\mu\text{A}$ $V_{CC}=3V$			0.1	V
		$V_{CC}=4.5V$			0.1	
		$V_{CC}=5.5V$			0.1	
		$I_{OL}=12\text{mA}$ $V_{CC}=3V$			0.36	
		$V_{CC}=4.5V$			0.36	
		$V_{CC}=5.5V$			0.36	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0V \sim 5.5V$, $V_{IN}=V_{CC}$ or GND			± 0.1	μA
Quiescent Supply Current	I_{CC}	$V_{CC}=5.5V$, $V_{IN}=5.5V$ or GND $I_{OUT}=0$			2	
Input Capacitance	C_{IN}	$V_{CC}=3.3V$, $V_{IN}=V_{CC}$ or GND		3		pF

■ DYNAMIC CHARACTERISTICS

$T_A=25^\circ\text{C}$, unless otherwise specified, Input: $t_R, t_f \leq 2.5\text{ns}$; PRR $\leq 1\text{MHz}$

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Clock frequency	F_{CLOCK}	$V_{CC}=3V \pm 0.3V$			100	MHz
Pulse duration	t_w	$V_{CC}=3V \pm 0.3V$, $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ in Low	5.5			ns
		$V_{CC}=3V \pm 0.3V$, CLK	5.5			
Setup time before CLK↑	t_{su}	$V_{CC}=3V \pm 0.3V$, $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ inactive	0			ns
		Data	4			
Hold time ,data after CLK↑	t_h	$V_{CC}=3V \pm 0.3V$	0.5			ns
Clock frequency	F_{CLOCK}	$V_{CC}=5V \pm 0.5V$			140	MHz
Pulse duration	t_w	$V_{CC}=5V \pm 0.5V$, $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ in Low	4.5			ns
		$V_{CC}=3V \pm 0.3V$, CLK	4.5			
Setup time before CLK↑	t_{su}	$V_{CC}=5V \pm 0.5V$, $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ inactive	0			ns
		Data	3			
Hold time ,data after CLK↑	t_h	$V_{CC}=5V \pm 0.5V$	0.5			ns

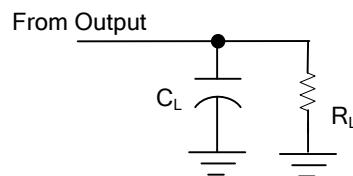
■ DYNAMIC CHARACTERISTICS (See Fig. 1 and Fig. 2 for test circuit and waveforms.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Maximum clock	F_{MAX}	$V_{CC}=3V \pm 0.3V, C_L=50\text{pF}, R_L=500\Omega$	100	125		MHz
Propagation delay from input ($\overline{\text{PRE}}$ or $\overline{\text{CLR}}$) to output(Q or Q̄)	t_{PLH}	$V_{CC}=3V \pm 0.3V, C_L=50\text{pF}, R_L=500\Omega$	3.5	8	12	ns
	t_{PHL}	$V_{CC}=3V \pm 0.3V, C_L=50\text{pF}, R_L=500\Omega$	4	10.5	12	
Propagation delay from input (CLK) to output(Q or Q̄)	t_{PLH}	$V_{CC}=3V \pm 0.3V, C_L=50\text{pF}, R_L=500\Omega$	4.5	8	13.5	ns
	t_{PHL}	$V_{CC}=3V \pm 0.3V, C_L=50\text{pF}, R_L=500\Omega$	3.5	8	14	
Maximum clock	F_{MAX}	$V_{CC}=5V \pm 0.5V$	140	160		MHz
Propagation delay from input ($\overline{\text{PRE}}$ or $\overline{\text{CLR}}$) to output(Q or Q̄)	t_{PLH}	$V_{CC}=5V \pm 0.5V, C_L=50\text{pF}, R_L=500\Omega$	2.5	6	9	ns
	t_{PHL}	$V_{CC}=5V \pm 0.5V, C_L=50\text{pF}, R_L=500\Omega$	3	8	9.5	
Propagation delay from input (CLK) to output(Q or Q̄)	t_{PLH}	$V_{CC}=5V \pm 0.5V, C_L=50\text{pF}, R_L=500\Omega$	3.5	6	10	ns
	t_{PHL}	$V_{CC}=5V \pm 0.5V, C_L=50\text{pF}, R_L=500\Omega$	2.5	6	10	

OPERATING CHARACTERISTICS

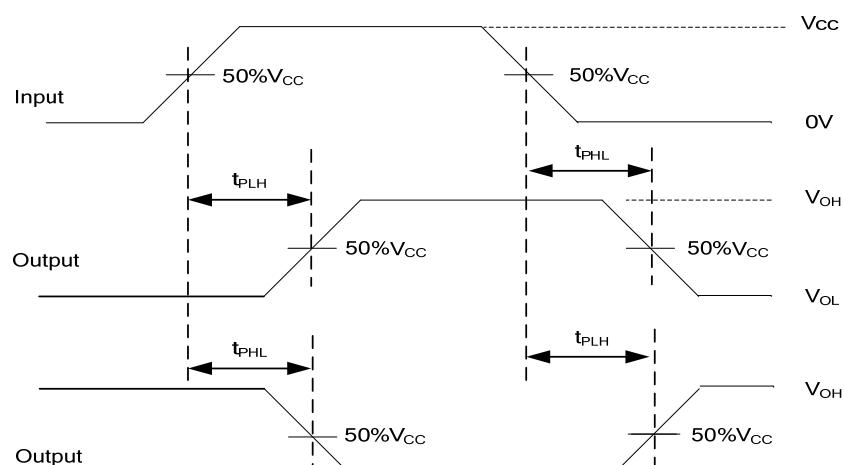
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{pd}	$C_L=50\text{pF}, f=1\text{MHz}, V_{CC}=3.3V$		45		pF

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

Note: C_L includes probe and jig capacitance.



PROPAGATION DELAY TIMES

Fig. 1 Load circuitry for switching times.

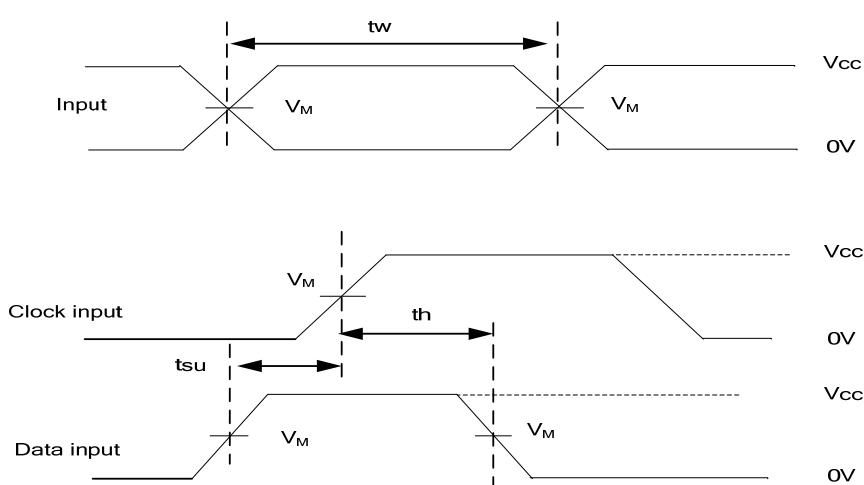


Fig. 2 Propagation delay from input to output and input voltage waveforms.

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.

