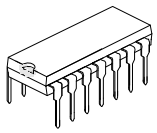
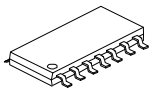
U74HC74

CMOS IC

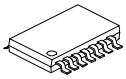
DUAL D FLIP-FLOP WITH SET AND RESET,POSITIVE-EDGEN TRIGGER



DIP-14



SOP-14U



TSSOP-14U

■ DESCRIPTION

The **U74HC74** contains dual D flip-flops and each flip-flop has independent DATA, $\overline{SET}$, $\overline{RESET}$ and clock inputs and complementary outputs Q and $\overline{Q}$. A low level at appropriate input helps $\overline{SET}$ and $\overline{RESET}$ adjust the output. Data will be transferred to the output during the low-to-high transition of the CLK while $\overline{SET}$ and $\overline{RESET}$ are high.

■ FEATURES

* Operation Voltage Range: 2 ~ 6V
* Buffered Inputs
* Asynchronous Set and Reset
* Complementary Outputs
* High Noise Immunity

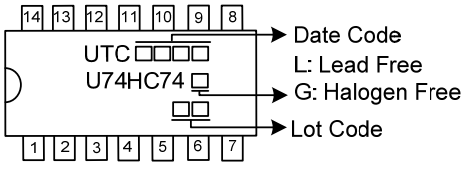
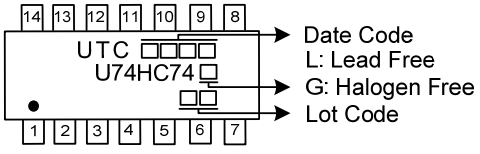
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC74L-D14-T	U74HC74G-D14-T	DIP-14	Tube
U74HC74L-UEA-R	U74HC74G-UEA-R	SOP-14U	Tape Reel
U74HC74L-UEB-R	U74HC74G-UEB-R	TSSOP-14U	Tape Reel

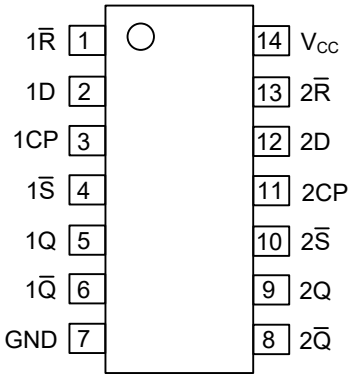
U74HC74G-D14-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) D14: DIP-14, UEA: SOP-14U, UEB: TSSOP-14U
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

DIP-14	SOP-14U / TSSOP-14U
	

■ PIN CONFIGURATION



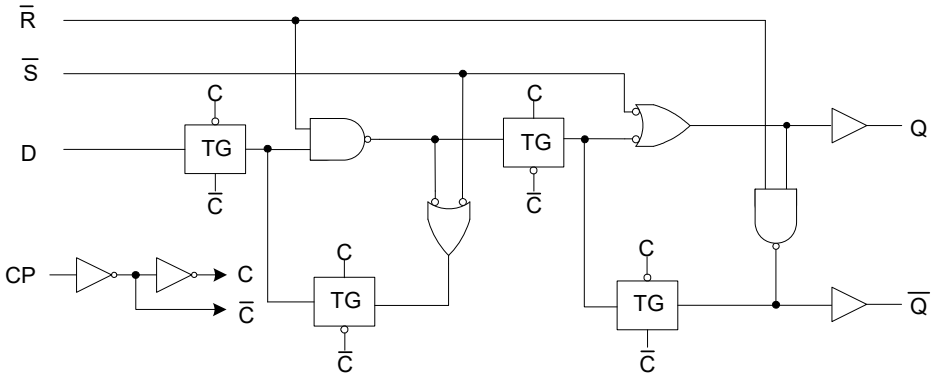
■ FUNCTION TABLE (each gate)

INPUT			OUTPUT		
$\overline{SET}$	$\overline{RESET}$	CP	D	Q	$\overline{Q}$
L	H	×	×	H	L
H	L	×	×	L	H
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	×	Q0	$\overline{Q0}$
L	L	×	×	H (note)	H (note)

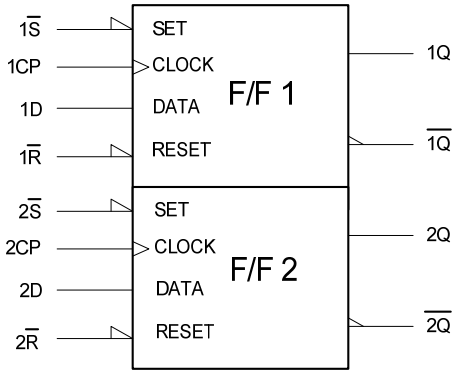
Note: Unstable state, it will not persist when set and reset inputs return to their inactive level.

■ FUNCTIONAL DIAGRAM

Logic Diagram



IEC logic symbol



■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)(Note)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ +7	V
Input Voltage	V_{IN}	0 ~ V_{CC}	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Input Clamp Current	I_{IK}	±20	mA
Output Clamp Current	I_{OK}	±20	mA
Output Current	I_{OUT}	±25	mA
V_{CC} or GND Current	I_{CC}	±50	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note: 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	MIN	TYP	MAX	UNIT
Supply Voltage		V_{CC}	2		6	V
Input Voltage		V_{IN}	0		V_{CC}	V
Output Voltage		V_{OUT}	0		V_{CC}	V
Input Transition Rise or Fall Rate	V_{CC}=2V	t_R, t_F			1000	ns
	V_{CC}=4.5V				500	ns
	V_{CC}=6V				400	ns
Operating Temperature		T_A	-40		+125	°C

■ STATIC CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T_A=25°C			T_A=-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
High-Level Input Voltage	V_{IH}	V_{CC}=2.0V	1.5			1.5			V
		V_{CC}=4.5V	3.15			3.15			V
		V_{CC}=6.0V	4.2			4.2			V
Low-Level Input Voltage	V_{IL}	V_{CC}=2.0V			0.5			0.5	V
		V_{CC}=4.5V			1.35			1.35	V
		V_{CC}=6.0V			1.8			1.8	V
High-Level Output Voltage	V_{OH}	V_{CC}=2.0V, I_{OH}=-20μA	1.9			1.62			V
		V_{CC}=4.5V, I_{OH}=-20μA	4.4			4.12			V
		V_{CC}=6.0V, I_{OH}=-20μA	5.9			5.72			V
		V_{CC}=4.5V, I_{OH}=-4mA	3.98			3.7			V
		V_{CC}=6V, I_{OH}=-5.2mA	5.48			5.2			V
Low-Level Output Voltage	V_{OL}	V_{CC}=2.0V, I_{OL}=20μA			0.1			0.14	V
		V_{CC}=4.5V, I_{OL}=20μA			0.1			0.14	V
		V_{CC}=6.0V, I_{OL}=20μA			0.1			0.14	V
		V_{CC}=4.5, I_{OL}=4mA			0.26			0.33	V
		V_{CC}=6, I_{OL}=5.2mA			0.26			0.33	V
Input Leakage Current	$I_{I(LEAK)}$	V_{CC}=6.0V, V_{IN}=V_{CC} or GND			±0.1			±0.1	μA
Quiescent Supply Current	I_Q	V_{CC}=6.0V, V_{IN}=V_{CC} or GND, I_{OUT}=0			4			40	μA

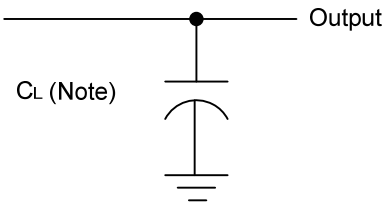
■ DYNAMIC CHARACTERISTICS (Input: t_R, t_F=6ns, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T_A=25°C			T_A=-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation delay from input (CP) to output(Q, $\overline{Q}$)	t_{PLH}/t_{PHL}	V_{CC} =2.0V, C_L=50pF			175			265	ns
		V_{CC} =4.5V, C_L=50pF			35			53	ns
		V_{CC} =6.0V, C_L=50pF			30			45	ns
Propagation delay from input ($\overline{R}$, $\overline{S}$) to output (Q, $\overline{Q}$)	t_{PLH}/t_{PHL}	V_{CC} =2.0V, C_L=50pF			200			300	ns
		V_{CC} =4.5V, C_L=50pF			40			60	ns
		V_{CC} =6.0V, C_L=50pF			34			51	ns
Output Transition Time	t_{TLH}/t_{THL}	V_{CC} =2.0V, C_L=50pF			75			110	ns
		V_{CC} =4.5V, C_L=50pF			15			22	ns
		V_{CC} =6.0V, C_L=50pF			13			19	ns
CP frequency	f_{MAX}	V_{CC} =5V, C_L=15pF		50			50		MHZ

■ OPERATING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C_{IN}	V_{CC}=6.0V, V_{IN}=V_{CC} or GND			10	pF
Power Dissipation Capacitance	C_{PD}	No Load		25		pF

■ TEST CIRCUIT AND WAVEFORMS



Note: C_L includes probe and jig capacitance.