ON Semiconductor

Is Now

To learn more about onsemi™, please visit our website at
www.onsemi.com

ON Semiconductor®

74VHC74
Dual D-Type Flip-Flop with Preset and Clear

Features

- High Speed: f_{MAX} = 170MHz (typ.) at T_A = 25°C
- High noise immunity: $V_{NIH} = V_{NIL}$ = 28% V_{CC} (min.)
- Power down protection is provided on all inputs
- Low power dissipation: I_{CC} = 2μA (max.) at T_A = 25°C
- Pin and function compatible with 74HC74

General Description

The VHC74 is an advanced high speed CMOS Dual D-Type Flip-Flop fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation. The signal level applied to the D input is transferred to the Q output during the positive going transition of the CK pulse. $\overline{CLR}$ and $\overline{PR}$ are independent of the CK and are accomplished by setting the appropriate input LOW.

An input protection circuit ensures that 0V to 7V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5V to 3V systems and two supply systems such as battery backup. This circuit prevents device destruction due to mismatched supply and input voltages.

Ordering Information

Order Number	Package Number	Package Description
74VHC74M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74VHC74SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74VHC74MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74VHC74N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

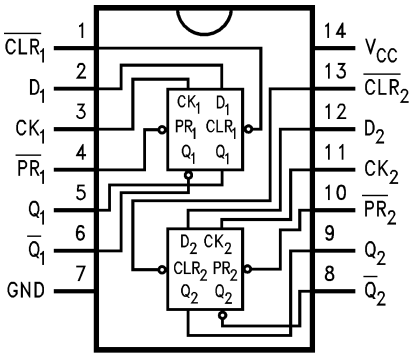
Device also available in Tape and Reel. Specify by appending suffix letter “X” to the ordering number.

All packages are lead free per JEDEC: J-STD-020B standard.

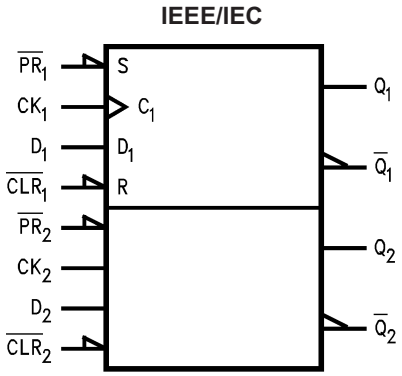
August-2017, Rev. 2

Publication Order Number:
74VHC74/D

Connection Diagram



Logic Symbol



Pin Description

Pin Names	Description
D_1, D_2	Data Inputs
CK_1, CK_2	Clock Pulse Inputs
$\overline{CLR}_1$, $\overline{CLR}_2$	Direct Clear Inputs
$\overline{PR}_1$, $\overline{PR}_2$	Direct Preset Inputs
Q_1, $\overline{Q}_1$, Q_2, $\overline{Q}_2$	Output

Truth Table

Inputs				Outputs		
$\overline{CLR}$	$\overline{PR}$	D	CK	Q	$\overline{Q}$	Function
L	H	X	X	L	H	Clear
H	L	X	X	H	L	Preset
L	L	X	X	H(1)	H(1)	
H	H	L	↗	L	H	
H	H	H	↗	H	L	
H	H	X	↘	Q_n	$\overline{Q}_n$	No Change

Note:

1. This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (HIGH) state.

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	–0.5V to +7.0V
V_{IN}	DC Input Voltage	–0.5V to +7.0V
V_{OUT}	DC Output Voltage	–0.5V to V_{CC} + 0.5V
I_{IK}	Input Diode Current	–20mA
I_{OK}	Output Diode Current	±20mA
I_{OUT}	DC Output Current	±25mA
I_{CC}	DC V_{CC} / GND Current	±50mA
T_{STG}	Storage Temperature	–65°C to +150°C
T_L	Lead Temperature (Soldering, 10 seconds)	260°C

Recommended Operating Conditions[2]

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. ON Semiconductor does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	2.0V to +5.5V
V_{IN}	Input Voltage	0V to +5.5V
V_{OUT}	Output Voltage	0V to V_{CC}
T_{OPR}	Operating Temperature	–40°C to +85°C
t_r, t_f	Input Rise and Fall Time, V_{CC} = 3.3V ± 0.3V V_{CC} = 5.0V ± 0.5V	 0ns/V ~ 100ns/V 0ns/V ~ 20ns/V

Note:

2. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	Conditions		T_A = 25°C			T_A = –40°C to +85°C		Units
					Min.	Typ.	Max.	Min.	Max.	
V_{IH}	HIGH Level Input Voltage	2.0			1.50			1.50		V
		3.0–5.5			0.7 x V_{CC}			0.7 x V_{CC}		
V_{IL}	LOW Level Input Voltage	2.0					0.50		0.50	V
		3.0–5.5					0.3 x V_{CC}		0.3 x V_{CC}	
V_{OH}	HIGH Level Output Voltage	2.0	V_{IN} = V_{IH} or V_{IL}	I_{OH} = –50µA	1.9	2.0		1.9		V
		3.0			2.9	3.0		2.9		
		4.5			4.4	4.5		4.4		
		3.0		I_{OH} = –4mA	2.58			2.48		
		4.5		I_{OH} = –8mA	3.94			3.80		
V_{OL}	LOW Level Output Voltage	2.0	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50µA		0.0	0.1		0.1	V
		3.0				0.0	0.1		0.1	
		4.5				0.0	0.1		0.1	
		3.0		I_{OL} = 4mA			0.36		0.44	
		4.5		I_{OL} = 8mA			0.36		0.44	
I_{IN}	Input Leakage Current	0–5.5	V_{IN} = 5.5V or GND				±0.1		±1.0	µA
I_{CC}	Quiescent Supply Current	5.5	V_{IN} = V_{CC} or GND				2.0		20.0	µA

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	Conditions	T_A = 25°C			T_A = –40°C to +85°C		Units
				Min.	Typ.	Max.	Min.	Max.	
f_{MAX}	Maximum Clock Frequency	3.3 ± 0.3	C_L = 15pF	80	125		70		MHz
			C_L = 50pF	50	75		45		
		5.0 ± 0.5	C_L = 15pF	130	170		110		
			C_L = 50pF	90	115		75		
t_{PLH}, t_{PHL}	Propagation Delay Time (CK-Q, $\overline{Q}$)	3.3 ± 0.3	C_L = 15pF		6.7	11.9	1.0	14.0	ns
			C_L = 50pF		9.2	15.4	1.0	17.5	
		5.0 ± 0.5	C_L = 15pF		4.6	7.3	1.0	8.5	
			C_L = 50pF		6.1	9.3	1.0	10.5	
t_{PLH}, t_{PHL}	Propagation Delay Time ($\overline{CLR}$, $\overline{PR}$ -Q, $\overline{Q}$)	3.3 ± 0.3	C_L = 15pF		7.6	12.3	1.0	14.5	ns
			C_L = 50pF		10.1	15.8	1.0	18.0	
		5.0 ± 0.5	C_L = 15pF		4.8	7.7	1.0	9.0	
			C_L = 50pF		6.3	9.7	1.0	11.0	
C_{IN}	Input Capacitance		V_{CC} = Open		4	10		10	pF
C_{PD}	Power Dissipation Capacitance		(3)		25				pF

Note:

3. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained from the equation: I_{CC} (opr.) = C_{PD} • V_{CC} • f_{IN} + I_{CC} / 2 (per F/F).

AC Operating Requirements

Symbol	Parameter	V_{CC} (V)(4)	T_A = 25°C		T_A = –40°C to +85°C	Units
			Typ.	Guaranteed Minimum		
t_W(L), t_W(H)	Minimum Pulse Width (CK)	3.3		6.0	7.0	ns
		5.0		5.0	5.0	
t_W(L)	Minimum Pulse Width ($\overline{CLR}$, $\overline{PR}$)	3.3		6.0	7.0	ns
		5.0		5.0	5.0	
t_S	Minimum Setup Time	3.3		6.0	7.0	ns
		5.0		5.0	5.0	
t_H	Minimum Hold Time	3.3		0.5	0.5	ns
		5.0		0.5	0.5	
t_{REC}	Minimum Recovery Time ($\overline{CLR}$, $\overline{PR}$)	3.3		5.0	5.0	ns
		5.0		3.0	3.0	

Note:

4. V_{CC} is 3.3 ± 0.3V or 5.0 ± 0.5V

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Flip-Flops ***category:***

Click to view products by ON Semiconductor ***manufacturer:***

Other Similar products are found below :

NLV14027BDG NLX1G74MUTCG 703557B 5962-90606022A 5962-9060602FA NLV14013BDR2G M38510/30104BDA M38510/07106BFA NTE4598B 74LVC74APW-Q100J 74LCX16374MTDX 74LVT74D,118 74VHCT9273FT(BJ) MM74HC374WM 74LVX74MTCX CD40174BF3A HMC723LC3CTR MM74HCT574MTCX 5962-8681501RA MM74HCT273WM SN74LVC74APW SN74LVC74AD SN74HC273DWR MC74HC11ADG M74HC175B1R M74HC174RM13TR 74ALVTH16374ZQLR 74ALVTH32374ZKER 74VHCV374FT(BJ) 74VHCV574FT(BJ) SNJ54ALS574BJ SN74LVC74ADR SN74HC574PWR SN74HC374AN SN74AS574DWR SN74ALS175NSR SN74HC175D SN74AC74D 74AHC1G79GV.125 74AHC74D.112 74HC112D.652 74HC574D.652 74HCT173D.652 74HCT374D.652 74AHC574D.118 74AHCT1G79GW.125 74HC273D.652 74HC74D.653 74HC107D.652 74HC574D.653